

The Mining Journal

LONDON, MAY 20, 1960

Vol. 254. No. 6509.

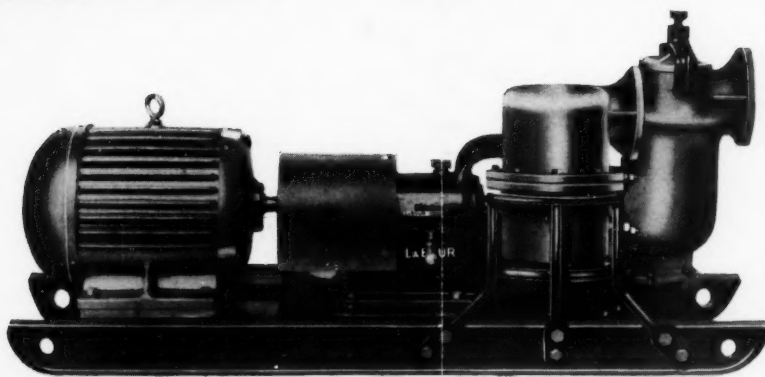
Price Ninepence

THE JOHN CRERAR LIBRARY
JUN 9 - 1960

622 X-1
R-4

**snoring
by design**

LaBour Pumps for mining duties have been designed, not adapted, for such applications, and will continue to snore without wear or damage to moving parts. The type USL is a high capacity centrifugal pump which is self-priming without mechanical means, no close clearance, and an open type impeller.



LABOUR PUMPS

BRITISH LABOUR PUMP CO LTD BLUNDELL ST LONDON N7
Telephone: NORTH 6601-5

CORE RECOVERY...

"Over our long history as drilling contractors, we have specialised in mineral prospecting with maximum core recovery."

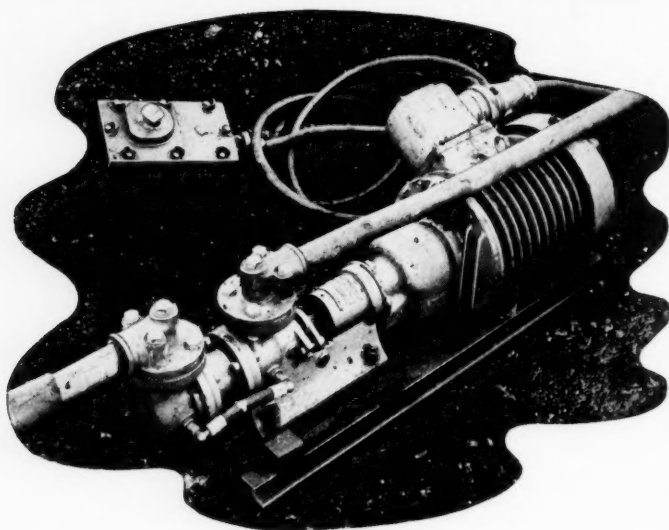
JOHN THOM LIMITED

CHADDOCK LANE, BOOTHSTOWN
WALKDEN, LANCS.

Telephone : Walkden 3271/2/3
Telegrams : "Thom-Walkden"



A Member of the Cementation Group of Companies.

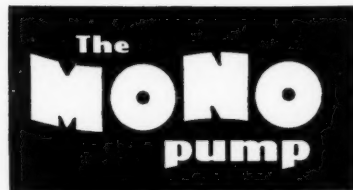


The MONO FACE UNIT FOR NUISANCE WATER

- ★ BUILT FOR EASY HANDLING
IN RESTRICTED FACE-WORKING
- ★ CONVENIENT PLUG-IN TO
DRILL POWER PANEL

To deal with nuisance water near workings, a new Mono pumping unit has been developed at the request of Mining Engineers. The unit is designed for easy handling in the restricted space at the face and the special low voltage Buxton certified motor is fitted with a 30 ampere socket for convenient connection to the normal drill power panel.

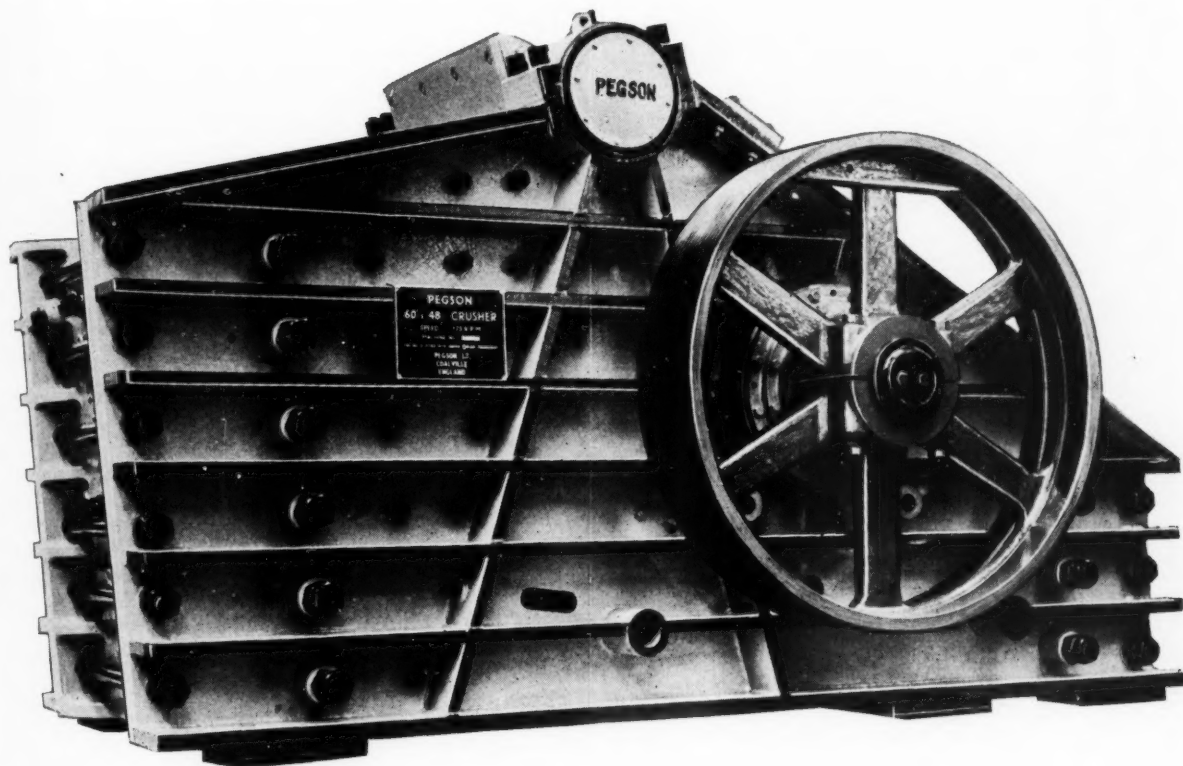
With its self-priming, snoring and suction ability the Mono Pump can deal effectively with almost the last drop of water causing hindrance to the efficient working of the face.



MONO PUMPS LTD., MONO HOUSE, SEKFORDE STREET, LONDON, E.C.1 Telephone : CLErkenwell 8711 Telegrams : Monopumps Phone London
United Kingdom Branches : Belfast, Birmingham, Bristol, Glasgow, Manchester, Newcastle and Wakefield. And Overseas : Dublin, Durban, Johannesburg, Melbourne and Sydney.

**for performance
that pays . . .**

..... install Pegson Primary Crushers. They are available in sizes ranging to 72" x 54", the larger machines being capable of taking huge feed sizes with consequent economies in secondary blasting whilst providing the higher outputs that today's projects demand. Of double or single toggle design with roller or plain bearings and capacities up to 600 tons per hour—there is a Pegson Crusher to meet every aggregate production requirement.



PEGSON

PRIMARY JAW CRUSHERS

PEGSON LIMITED, COALVILLE, LEICESTERSHIRE

London Office : Iddesleigh House, Caxton Street, S.W.1

Scottish Office : 7 Lister Road, Hillington Industrial Estate, Glasgow

Telephone : Coalville 1234 (10 lines)

Telephone : Abbey 2373

Telephone : Halfway 1800



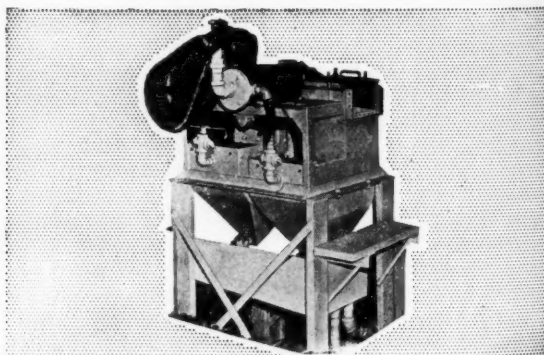
... and now Denver takes over

The ore leaves the shaft and Denver equipment comes into the picture for the whole process of mineral recovery—crushing, screening, grinding and separation.

Denver equipment, used by thousands of companies all over the world, is constructed for 24 hours of completely reliable operation a day. Denver engineers are always ready to advise on any problems connected with mineral recovery, from initial laboratory test work, to flowsheet design, selection of the most suitable equipment, and supervision of the construction and starting up of the complete plant.

MINERAL JIGS

- ★ Give increased recovery values.
 - ★ A selective pulsator and concentrating machine.
- ★ Easily adaptable to a wide range of problems under varying operating conditions.
 - ★ Large capacity—minimum water requirements.
- ★ Extreme selectivity with fool proof operation.



For further details of this and other Denver equipment, please write for Bulletin J2-B10.



FLOTATION
ENGINEERS

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT CO. LTD

15-17 CHRISTOPHER STREET · FINSBURY SQUARE · LONDON E.C.2.

Telephone: B1Shopsgate 0636

Cables: "DECOLON" London

DENVER · NEW YORK · VANCOUVER · TORONTO · MEXICO D.F. · LONDON · JOHANNESBURG

TIB.126c

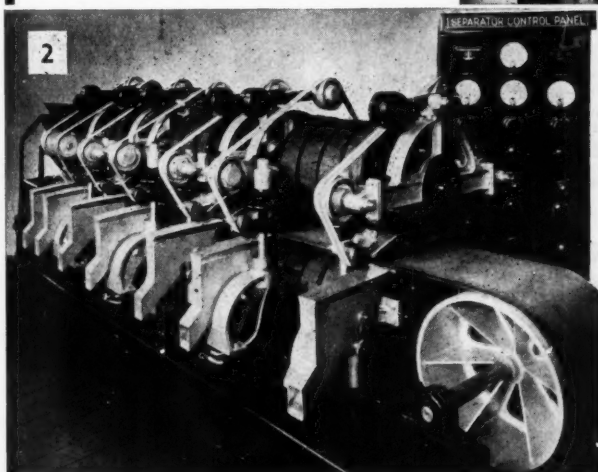
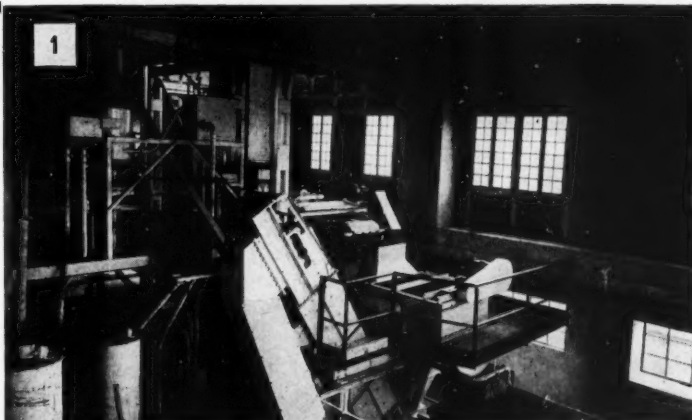
ONE WAY AND ANOTHER...

*Huntington Heberlein design and build
a comprehensive range of plants for
metalliferous mineral separation and treatment*

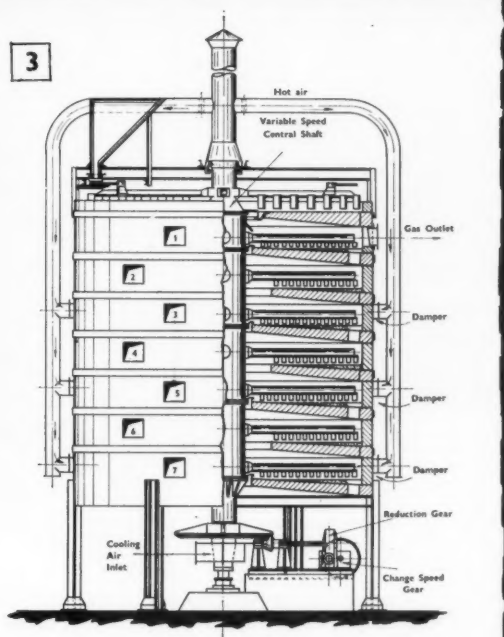
1 PRIMARY SEPARATION
Huntington Heberlein sink-float plants are treating from 100 to 10,000 tons of mine ore per day.

2 MAGNETIC SEPARATION
Huntington Heberlein high intensity magnetic separators are treating tungsten, tin-columbite, ilmenite-columbite, diamondiferous staurolite concentrates and other ores at home and overseas.

3 ROASTING AND CALCINATION
Huntington Heberlein furnaces are desulphurising iron pyrites, blende, molybdenite and copper-cobalt concentrates. They are also designed for effecting the magnetic permeability differential of refractory concentrates and for specific chemical processing.



WE ARE ALSO SPECIALISTS IN
FERROUS AND NON-FERROUS SINTERING
PROCESSES AND PLANTS



SERVICE TO THE MINING INDUSTRY BY

Huntington, Heberlein & Co. Ltd



SIMON HOUSE, 28-29 DOVER STREET, LONDON, W.1. Telephone: Hyde Park, 8191 Telex: 2-3165 Telegrams: Innovation Wesphone London Telex

COMMONWEALTH REPRESENTATIVES:

Simon-Carves (Africa) (Pty) Ltd: Johannesburg

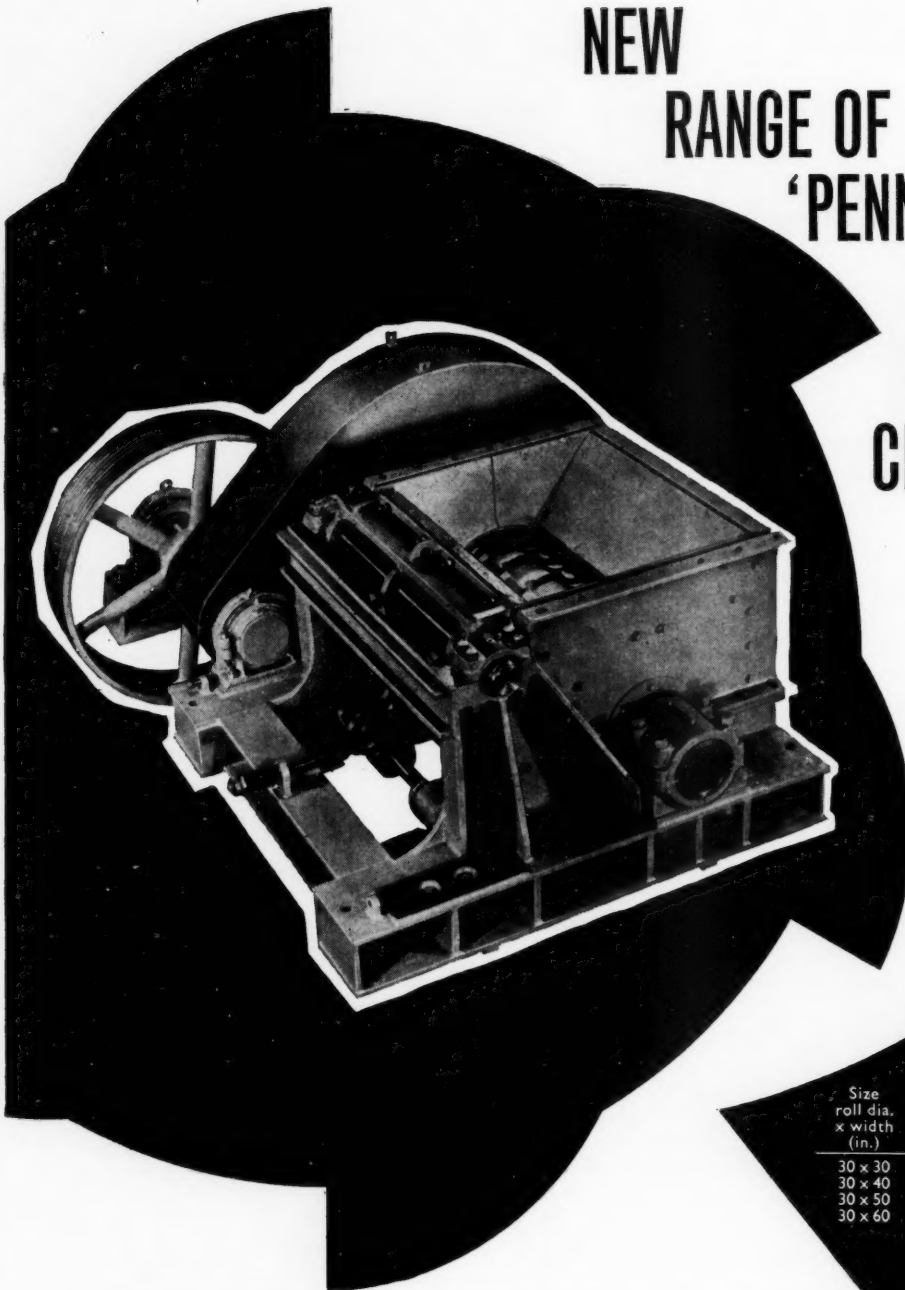
Simon-Carves (Australia) Pty Ltd: Botany N.S.W

Simon-Carves Ltd: Calcutta

Simon-Carves Ltd: Toronto

MHD

NEW RANGE OF 'PENNSYLVANIA' SINGLE ROLL CRUSHERS



Size roll dia. x width (in.)	Max. Size of Feed (in.)	Capacity in tons per hour when crushing to 5 in.	Motor H.P.
30 x 30	20	200-250	100
30 x 40	24	250-300	150
30 x 50	30	300-400	200
30 x 60	36	400-500	250

A full range of Pennsylvania 'Hercules' single roll crushers of improved design is now available, consisting of 4 sizes for primary and secondary reduction.

The new features include all-welded construction incorporating a special steel lined crushing zone. A new breaker plate mechanism regulates the size of the product and protects the moving parts from damage by uncrushable materials. The table shows the average capacities and power requirements of this range of crushers. Other types are manufactured to handle soft rocks, minerals and coal with equal efficiency.

F. & C.

OF ENGLAND

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND
Fraser & Chalmers Engineering Works, Erith, Kent.

In association with Pennsylvania Crusher Division, Bath Iron Works, U.S.A.



Just a touch...

... from the Philosopher's Stone and all would be turned to gold. That was the theory, at any rate. It didn't work—'you can't get the Stone', as they used to say over their evening elixirs at the Alchemists' Club. But you can get I.C.I.'s **'Cassel' brand Sodium Cyanide** for the extraction of gold (and silver) from ore.

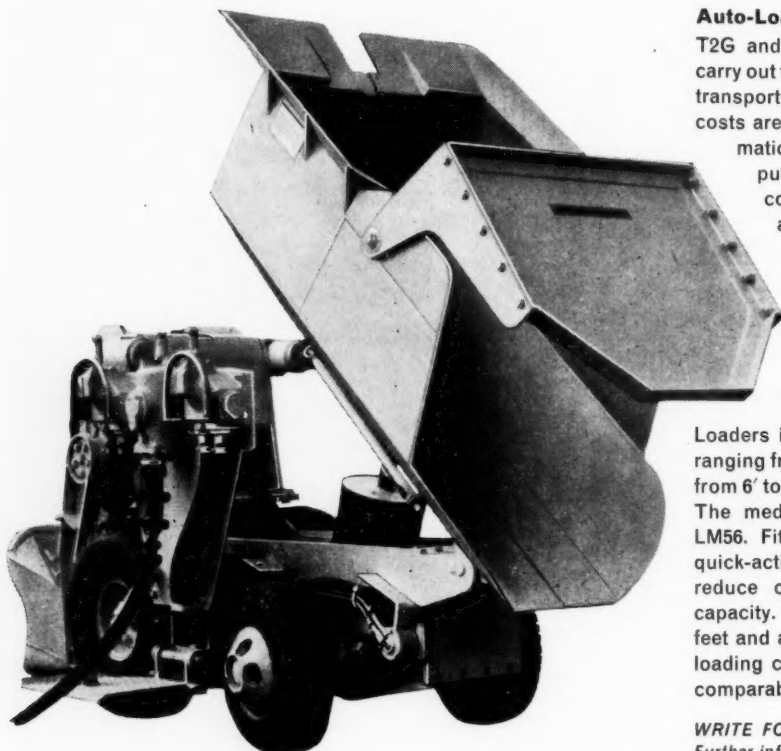
Cyanide is only one of the chemicals I.C.I. offers for ore treatment processes, and there's a comprehensive ore-treatment service, based on long experience, to go with them. If you want to know more, get in touch with:

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1.



Let **ATLAS COPCO** take the load

... in mining and contracting



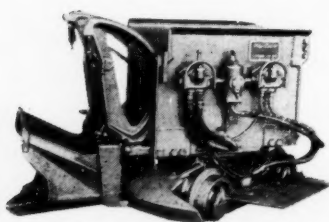
T2GH Auto-Loader

Atlas Copco

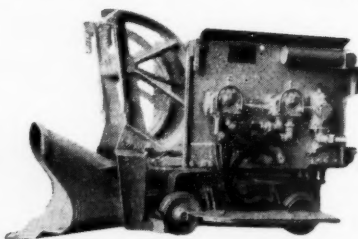
puts compressed air to work for the world

Atlas Copco AB, Stockholm 1, Sweden

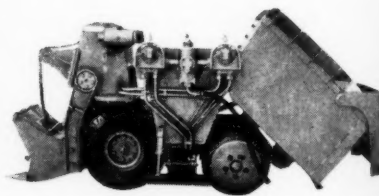
In the U.K. Atlas Copco (Great Britain) Ltd., Hemel Hempstead, Herts.



LM56 rail-mounted loader



LM250 rail-mounted loader



T2G Auto-loader

Air-powered Loaders and Dumpers for every underground requirement

Headroom, track gauge, car size, clean-up range ... you take all these into consideration before you buy loaders! That's why you should know about the Atlas Copco range. This includes loaders and dumpers to meet every requirement in underground work and to handle all kinds of muck—abrasive, sticky or free-running—with equal efficiency.

Auto-Loaders

T2G and T2GH auto-loaders allow one man to carry out the complete mucking operation—loading, transporting and dumping. As a result, labour costs are considerably reduced. Fitted with pneumatic tyres, these high manoeuvrable loaders put up excellent performances in both confined spaces and wide areas. Maintenance costs are lower as the rubber tyres help to reduce stress on the loaders.

The T2G dumps directly into chutes or ore pockets, whilst the T2GH has a greater dumping height allowing it to discharge directly on to conveyors.

LM Loaders (rail-mounted)

Loaders in the LM series have bucket capacities ranging from 4 to 21 cubic feet and clean-up ranges from 6' to 12' 5" (1.8 to 3.8 m.) without side-ploughs. The medium-sized model of this series is the LM56. Fitted with pneumatic side-swinging and quick-action controls, this machine is designed to reduce operator fatigue and increase loading capacity. In fact, with a bucket capacity of 7 cubic feet and a clean-up range of 8' 8" (2.7m³), it has a loading capacity in excess of any other loader of comparable size!

WRITE FOR LITERATURE

Further information about Atlas Copco loaders and dumpers is given in a series of leaflets and folders—readily available on request. Write for copies to your local Atlas Copco company or agent or to the address below.



Sales and service in ninety countries

With companies or agents in ninety countries, Atlas Copco is the world's largest organisation specialising solely in compressed air equipment. Products include stationary and portable compressors, rock drills, loaders, hoists, paint-spraying equipment and air tools of every description. Wherever you are, the international Atlas Copco group offers expert advice on the selection of equipment and provides a complete after-sales service.

Lon

In

Power
Resea
Coal
Metal
Austr
Ne
A.N.
Ho
Brazi
A. C
Bri
Lates
Op
Minir
Mach
Tech
Metal
Minir
Comp
Lond
Comi
Rand
Ap
Publi

Assist
R.

E
G.

Tel
Tutwo

Annua

The Mining Journal

London, May 20, 1960

In this issue . . .

Power for the Rhodesias	575
Research on Sintering	576
Coal Chemicals	576
Metals for Britain?	577
Australian Arbitration Commission Rejects New Wage Demands	577
A.N. Slurries for Hard Rock and Wet Hole Blasting	578
Brazilian Iron Ore in 1959	579
A Central Engineering Service in the British Coalmining Industry	580
Latest Kolbe Wheel Excavator in Operation	582
Mining Miscellany	583
Machinery and Equipment	586
Technical Briefs	587
Metals and Minerals	588
Mining Finance	590
Company Meetings and Announcements	591
London Metal and Ore Prices	592
Coming Events	593
Rand and Orange Free State Returns for April	596
Publications Received	598

Vol. 254

No. 6509

Established 1835

Editor

U. Baliol Scott

Deputy Editor

A. Graham Thomson

Assistant Editor
R. Bowran

Assistant Financial Editor
R. A. Nuttall

Display Advertisement Manager

E. S. Hooper

Circulation

Robert Budd

Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott
(Chairman)

U. Baliol Scott
(Managing)

G. A. Baliol Scott

R. A. Ellefsen

15 WILSON STREET,
LONDON, E.C.2

Telegraphic
Tutwork London

Telephone
MONarch 2567 (3 lines)

Annual Subscription £3 10s. Single copy ninepence

Power for the Rhodesias

ON Tuesday morning, May 17, the Queen Mother switched on a 100 mW turbo-generator of British manufacture and formally opened the Kariba hydroelectric project. Since December a generator of similar capacity has been feeding power to the Rhodesian Copperbelt. For four years 7,000 Africans and 1,500 Europeans have been engaged on the construction of this mighty project, which ranks among the greatest civil engineering achievements of all time.

The flow of current from Kariba has finally laid the bogey of inadequate power supplies, which has been a major obstacle to the economic development of the three territories comprising the Central African Federation. In the early post-war years the copper mines were plagued by a chronic shortage of electrical power. The Rhodesia Railways lacked the carrying capacity to bring to the Copperbelt sufficient coal from Rhodesia's only colliery, at Wankie, to meet the increased consumption of electrical power arising from the expansion of copper consumption, and this situation was aggravated by industrial expansion in Southern Rhodesia itself. The copper companies were compelled to substitute timber for coal and fortunes were made by denuding forests and delivering "cordwood" to the mines.

These difficulties were ultimately overcome by connecting the Copperbelt power grid to the Le Marinel hydro-electric station on the Lualaba River in the heart of the Belgian Congo, but the Belgian Government's decision to turn the Congo into an independent state on June 30 this year has introduced a new element into the situation. Although there is no reason to anticipate that Congo independence will have any adverse effects on the operations of Le Marinel, there can scarcely fail to be some anxiety in the existing circumstances as to the dependability of this source of supply. General relief will therefore be felt in the Copperbelt that Kariba is already functioning as an alternative source of supply.

How much the Federal Power Board will charge the copper companies for Kariba power is as yet a closely guarded secret, but for the time being, at any rate, the figure is unlikely to be specially low. It is significant that Mr. H. F. Oppenheimer, in his chairman's report to shareholders of Nchanga, said that some years must elapse before Kariba reached its full output and the industry could look for a significant reduction in the cost of power.

Four more generators are scheduled to come on stream at Kariba before the end of 1962, making a total of 600 mW, which is approximately equivalent to the existing generating capacity in the Rhodesias. This will complete the first stage of the Kariba project, which on present indications will cost about £74,000,000 — well inside the original estimate of £80,000,000. Tenders are already being invited for exploratory work on the second stage, costing about £45,000,000, which will raise Kariba's capacity to 1,500 mW instead of 1,200 mW as originally planned.

When it became apparent to the Federal Government that the growing demand for power expected from the mining industry, as well as from steadily increasing industrial and domestic consumption, could best be met by harnessing the hydro-electric resources of the region, a choice had to be made between the rival Kafue and Kariba schemes. The balance tilted in favour of Kariba in June, 1956, when the World Bank announced that it was prepared to make a £28,000,000 loan to the Federal Power Board for this project. Another £15,000,000 came from the Colonial Development Corporation and £3,000,000 from the Commonwealth Development Finance Company. In addition, a total of £24,000,000 was lent by the Northern Rhodesia copper companies and the British South Africa Company. Provided consumption estimates are fulfilled, the loans will be repaid out of revenue, which is also expected to provide about half the finance required for the second stage of the project.

While the Copperbelt has first claim to Kariba power, much of the output will be transmitted southwards to the industrial areas round Salisbury and Bulawayo for integration with existing power stations, and it is expected that the availability of an abundant and expanding supply of power will attract many new industries to the Federation. Kariba is truly a major contribution to the prosperity of Central Africa and its potential benefits, both to the mining industry and to the Federation as a whole, can scarcely be over-estimated.

RESEARCH ON SINTERING

There is a world-wide trend towards the operation of blast furnaces with a high percentage of self-fluxing sinter, high-blast temperatures and steam injection in order to achieve minimum coke rates and maximum productivity. In its annual report for 1959, the British Iron and Steel Research Association states that emphasis has again been placed by its Ironmaking Division on the properties and production of self-fluxing sinter, the effects of injecting steam and hydrocarbons into the hot blast, and the analysis of blast-furnace performance data. The pilot plant for SCICE (Stationary Charge in a Controlled Environment) has been erected and made ready for preliminary trials. Work on sinter and flame smelting pilot plants now constitutes a high proportion of the activities of this Division.

Concentration tests on the marginal Northamptonshire ironstone from Rutland and South Lincolnshire have been completed. Roasting in a reducing atmosphere, followed by grinding and magnetic separation, has yielded a concentrate with approximately 50 per cent of iron and 13-17 per cent of silica. It is considered that sufficient work has now been carried out on these marginal deposits for an economic appraisal to be made.

Samples of the so-called "bottom bed", which underlies the main ironstone horizon in the Northamptonshire field, have been collected from the Corby area. An examination of these samples has shown that no worthwhile concentration can be achieved by normal grinding and gravity separation. Further tests are being carried out using the reducing-roast/magnetic-separation process.

Two samples of Labrador fines have been examined, and the relative stickiness of one sample compared with the other has been shown to be associated with its higher clay content.

Further study has been made, both in the laboratory and on works trials, of the screening of blast furnace burden materials.

In regard to sintering, laboratory experiments have been carried out to determine to what extent solid fuel may be replaced by gaseous fuel. Hematite and magnetite mixes have

been used with town's gas, town's gas diluted with nitrogen, and a mixture of carbon monoxide and nitrogen as gaseous fuels. Under laboratory conditions it was not found possible to make sinter without some solid fuel in the bed.

Laboratory experiments have been carried out to determine the influence of sintering temperature on the strength of fluxed sinters. Pure magnetite and hematite ores have been used, and slag forming compounds, in the form of pure chemicals, have been added. The effects of peak bed temperature, time at high temperature and cooling rate have been noted. Both for self-fluxing sinters— $(\text{CaO} + \text{MgO}/\text{SiO}_2) = 1.35$ —made from hematite ore and for super-fluxed sinters— $(\text{CaO} + \text{MgO})/\text{SiO}_2 = 2.0$ —made from magnetite ore, sinter strength, as measured by a simple drop test, was related to peak temperature and to time at high temperature. In both series of experiments an increase in the quantity of gangue in the sinter mix meant that a lower peak temperature and a shorter time at high temperature were necessary in order to produce a strong sinter. Cooling rate appeared to be important only when self-fluxing sinters of high gangue content were made. Provided that the total gangue content of the sinter did not exceed about 30 per cent, strong super-fluxed sinter could be made which did not disintegrate on standing.

The experimental sinter box at the North-East Coast Laboratories has been used to study many aspects of fuel economy, including the effects of using preheated air when sintering home ores. A detailed study of the effect of the air/gas ratio during ignition on the strength of the sinter in the top layer of the bed has also been made.

A systematic series of tests, in which bed height, return fines input and coke content were varied over a wide range, has been carried out on home ores. It has been shown that the amount of coke needed is reduced by using deeper beds; in the case investigated it reached a minimum when the circulating load was approximately 25 per cent.

World-wide interest has been shown in the many processes being investigated for making iron other than in a blast-furnace. A considerable amount of information has been collected on these processes.

COAL CHEMICALS

The world-wide rapid growth of the organic chemistry industry has focused attention on the future raw material sources for this important industry, and of these coal must receive its due attention. Millions of tons of organic chemicals are annually used throughout the world, ranging from such basic raw materials as crude tar down to drugs and soaps. The organic chemistry industry represents a vast potential market for coal but, unfortunately for coal producers, the current glut of cheap petrol means that the petroleum industry is taking the lion's share of this market. This is particularly the case in the U.S. where petroleum accounts for more than 60 per cent of the raw materials used to produce organic and inorganic chemicals. Bountiful cheap petrol may, however, prove a relatively temporary phenomena considered in the context of long-term operations, and a swing towards coal as the mainstay of the organic chemistry industry is a distinct possibility.

However, today's coal mining industry cannot live on tomorrow's hopes and in the U.S., where competition between the coal producers and the oil industry is particularly intense, several big coal mining companies have recently stated their intention to break into the chemicals market. Representative of these is the Philadelphia & Reading Coal Corporation which earlier this year announced plans to build a \$100,000,000 plant in Pennsylvania to make chemicals from anthracite

silt and wastes. A new subsidiary company, the Reading Chemical Corporation, has been formed and it is the intention of this concern to utilize some 350,000,000 tons of mine refuse, and market synthesis gas and related chemicals. Although having many sceptics this scheme is obviously no wildcat venture but is the direct result of several years' intensive research involving the expenditure of \$1,000,000.

Such broadening of horizons by the coal producers, if attended by success, could well be the saving of the U.S. anthracite industry and ultimately be of profound benefit to the coal industries not only of the U.S. but also of Western Europe, now facing dwindling markets.

METALS FOR BRITAIN?

Strong criticism of the government's inaction in fostering the development of base metals in the United Kingdom was voiced by the Cornish Mining Development Association at its annual meeting, held at the Camborne School of Mines on May 4. The meeting unanimously resolved to have printed 1,200 or more copies of a booklet entitled *Metals for Britain*. Copies will be widely circulated and will be sent to all Members of Parliament, as well as to many members of the House of Lords, to local authorities, and to influential industrialists and commercial men in Cornwall.

The booklet contains the annual report of the Executive Committee, prepared by the chairman, Mr. J. H. Trounson, together with a short foreword by the hon. secretary, Mr. L. G. Brown, setting out the objects of the Association and stressing the necessity for an adequate supply of base metals in the United Kingdom.

Attention is drawn to the exceptional measures which have been widely adopted in other countries to encourage the search for new mineral deposits and to foster their exploitation. The view is expressed that, although Britain can never again expect to be self-sufficient in base metals, there are good reasons for thinking that considerable reserves of minerals yet exist beneath Britain's soil, and that, given the same degree of encouragement and co-operation from the government as is now common in other lands, these reserves could be worked economically.

Referring to the symposium convened by the Institution of Mining and Metallurgy in 1955 to consider Britain's need for a "National Mineral Policy", the report recalls that one of the most outstanding speeches at the conference was made by a chemical engineer of world renown, who expressed the opinion that the resources of the mining industry would be strained to the uttermost limit to provide the world with the metals that it would need during the next quarter of a century, and who further stated that it would be folly to rely upon the plastics as being substitutes for the metals likely to be in short supply within a few years.

The Association long ago reached the conclusion that the most effective means of reviving metal mining in Britain would be for government to grant such tax reliefs as are necessary to make the industry attractive to risk capital. This opinion, it is emphasized, has been strongly fortified by the action on those lines taken by the Irish Republican Government in 1955, which has already brought about a spectacular revival of mining activity in Eire where the industry had been practically dead for 80 years.

One of the facts emerging from the Symposium, is that the mineral potential of Britain is still very considerable. It is estimated that the mineral production of Cornwall and Devon alone, at the present price of metals, has exceeded £2,000,000,000, and such a figure establishes the district as being a mineral field of the first order of output on any world basis of comparison.

"When it is remembered that the mineral potential of Cornwall alone is far greater than that of the whole of Ireland", declares the report, "it is extremely disturbing to think of the revenue and employment that Britain is needlessly losing because of its government's apparent inability to appreciate the importance of a subject which is now well understood elsewhere."

"The fantastic situation has now arisen in which government tries to relieve comparatively heavy unemployment in Cornwall by scheduling the greater part of the county as a 'Development Area', and yet by its own fiscal policies it prevents the revival of mining, the staple industry of the region. Incidentally, it should never be forgotten that mining is one of the three primary industries and that few others create so much trade and employment, both direct and indirect."

AUSTRALIAN ARBITRATION COMMISSION REJECTS NEW WAGE DEMANDS

There is general satisfaction in Australian industry over the recent award of the Commonwealth Conciliation and Arbitration Commission. In the latter end of 1959, the Commission granted an increase of 15s. per week in the basic wage, and an increase of 20 per cent in rates for margins. Within a very brief period the unions again approached the Commission for a further increase of 22 per cent in the basic wage and for the restoration of the quarterly adjustment of the wage.

The industrial position was rapidly becoming serious with grave threat that Australian products, both primary and secondary, would be priced out of competition in the vital overseas markets, while the home wages bill faced an increase of approximately £A150,000,000 as a result of the 1959 award. The unions' application was vigorously contested by the mining and secondary industries. The incidence on government budgets was becoming so heavy, and the threat to inflation so threatening, that the Commonwealth Government, realizing the growing danger, intervened before the court. The majority of the States presented material showing the effect of a wage increase on their finances, but did not oppose the application. The court considered that it would be unsafe, and perhaps dangerous to increase the basic wage; it would be dangerous to the whole community including the wage and salary earner; inflation might be increased and the stability of the economy upset. Increase in the basic wage was refused, and the claim for restoration of the quarterly adjustment of the wage rejected. As a result of this award, there is now some sense of security in industry, for the immediate period.

There is a growing tendency for unions to demand bonuses from employers, over and above the wage rates awarded by the courts. Actually, a bonus is an act of grace and goodwill by employers to employees, but unions are demanding a bonus and a voice in determining the amount of the bonus, practically as a matter of right. Late last year, employees at the Townsville copper refinery of Mount Isa Mines Ltd., demanded a bonus, which was refused. Employees of the Wallarah Colliery were given a bonus, but returned their pay envelopes at the direction of the union. Mary Kathleen Uranium, granted a liberal and well based bonus, which was accepted by the union, but almost immediately was in dispute; the amount of the bonus approximated £9 per week, influenced by the amount of dividends to shareholders. On rejection of this bonus—previously approved—a bonus of £31 per week has been demanded, and the matter is to be brought before the Queensland industrial court.

A.N. SLURRIES FOR HARD ROCK AND WET HOLE BLASTING

DURING recent years the Iron Ore Co. of Canada has gradually been switching over to the use of ammonium nitrate explosives to cut blasting costs. In 1958, over 7,000,000 lb. of these explosives were used for the removal of 12,000,000 yards of rock and ore.

In the course of this changeover, which initially involved the use of dry ingredients such as pelletized ammonium nitrate mixed with a small proportion of diesel oil, the need arose for a more powerful and/or water compatible explosive for use in hard rock or in wet holes, or both. To find a do-it-yourself type of blasting agent for these purposes, the Iron Ore Co. of Canada consulted Dr. M. A. Cook, professor of metallurgy and director of explosives research, University of Utah, United States. Together, Dr. Cook and H. E. Farnum, Jr., manager of operations, IOC, in collaboration with Canadian Industries Ltd., suppliers of explosives to IOC, developed a slurry mixture of AN, TNT and water which was more powerful than the mixture of dry ingredients and which also possessed a number of other advantages. Now IOC has a number of explosives of this type that fills the company's needs and C-I-L have marketed a blasting agent known as Hydromex which has ample inherent water tolerance, and in which the water of the porridge-like slurry actually aids detonation by increasing the velocity and initial borehole pressure.

To mix the slurry, The Iron Ore Co. of Canada use a special rotating drum into which the AN is first poured and to this is added a hot 0.7 solution of AN and water, followed by pelleted TNT. After mixing for about a minute, the slurry is ready to be poured into the borehole. Mixing can be carried out at a rate of up to 3,000 lb. per hour.

At first, drilling 40 ft. deep holes on a 15 ft. x 15 ft. spacing, with the propagation wave moving diagonally across the blast set to give a true spacing of 10.6 ft. x 21 ft. or 7.9 cu. yds. per foot of borehole, the slurry shattered the rock at the bottom of the holes, but the rock in the upper half of the hole was not well broken. The spacing was, however, gradually opened up to a 21 ft. x 23 ft. pattern with 10 in. diameter holes, 40 ft. deep. By firing the holes diagonally, a true spacing of 15.5 ft. x 31 ft. or 17.8 yds. per foot of borehole was obtained. Using the same powder factor, the slurry powder column was now almost 23 ft. as against only 10 ft. previously. This pattern gave good results and there were few large pieces from the top of the hole.

In one large blast, 6½ in. holes, 40 ft. deep on a 16 ft. x 16 ft. spacing were used. When fired diagonally, the approximate true spacing was 10½ ft. x 21 ft. The slurry powder column was 29 ft. high allowing 11 ft. of stemming and providing the desired powder distribution throughout the hole. This gave good rock shattering and high shovel production leading to the belief that smaller holes can be utilized when high density, high-pressure slurries are used.

In the hard rock formations encountered by IOC there is a limit to the spacing spread since too wide a spread yields

We are indebted to Canadian Industries, Ltd., I.C.I. Ltd., Nobel Division (who are licensed to manufacture and sell these explosives in the U.K.) and a paper prepared by H. E. Farnum, Jr., for the Missouri School of Mines and Metallurgy for material from which this article has been derived

scalloped edges and a rough pit bottom, increasing the hazard and difficulty of the next drilling sequence and shovel maintenance costs as well as causing broken truck springs and shorter truck tyre life.

One of the biggest savings resulting from the use of slurry blasting agents by IOC has been in reduced drill costs. The operating cost for the 50-R rotary drills used is \$37.00 per operating hour, excluding bit costs, overheads or depreciation. The 9½ in. R2J rotary bits cost \$1,600 each and each is expected to yield 600 ft. of 10 in. borehole. Average penetration rate is 19 ft. per hour and the combined operation and bit costs amounts to \$4.60 per foot of borehole. Using slurry, rock breakage per hole, with the wider spacing, has been increased 100 per cent and by increasing the spacing broken rock costs have been reduced from 60 c. per yd. to 37.5 c. per yd., a saving of 39.5 per cent, which is considered to more than justify the additional cost of the slurry.

By switching from AN and fuel to a slurry blasting agent at a small slate pit, broken rock costs there have been reduced from 29 c. to 17 c. per yd.

Packaged slurry from Canadian Industries Ltd. has also been used by The Iron Ore Company of Canada, and when loaded in a polythene bag, this can be used in either wet or dry holes. In the case of dry holes, the bags are dropped from a collar and ruptured at the bottom of the hole so that the contents completely fill the hole. In the case of water-filled holes, the bags are dropped into the water and, as the mixture has a specific gravity of 1.4, the bags sink to the bottom of the hole.

If the water runs out of the slurry, the detonation pressure is reduced 30 per cent. Therefore, in the wet packaged material received by IOC from Canadian Industries Ltd. (as in the case of the Hydromex previously mentioned) a thickener was added to give a porridge-like consistency so preventing loss of water in case of bag failure during delivery.

The Iron Ore Co. of Canada considers that the new slurry (AN, TNT and water—65/20/15 percentages) has a number of advantages over the standard AN/Fuel mixture (AN, Fuel Oil—94/6 percentages). Because the specific gravity of the former is 1.4 compared with 0.8 for the latter, 1.7 lb. more of slurry can be loaded into each foot of borehole and bottom loading densities can be very high when using a combination

Figures are representative of costs using AN and fuel and slurry

Explosive	Depth (ft.)	Spacing (ft.)	Hole dia. (in.)	Powder col. (ft.)	Powder cost/yd. (c.)	Drilling cost/yd. (c.)	Broken Rock cost/yd. (c.)
AN & Fuel	40	15 x 15	10	18.5	6.75	55.2	61.95
Slurry	40	15 x 15	10	10.6	11.6	55.2	66.8
Slurry	40	21 x 23	10	22.8	11.6	25.7	37.3

load; since the critical unconfined diameter is about the same, holes smaller than 4 in. can be successfully detonated under confinement; because the slurry requires twice as big a booster as AN and fuel oil, the former is safer; the detonation rate for slurry is 5,500 metres per second compared with 2,800 m/s for AN and fuel oil; the explosion pressure developed by the slurry is 59 kilobars (about 867,000 lb. p.s.i.) compared with 18.5 kilobars for AN and fuel oil, thus producing a greater shattering effect on hard rock.

Slurry, however, costs 72 per cent more than the AN and fuel oil mixture and the IOC does not intend to replace all its AN/fuel oil mixtures with slurry, especially for soft rock and ores amenable to low-pressure explosives. To keep costs to a minimum, drill spacings are to be stretched to the fullest possible extent and the most suitable explosive used for each particular job, consistently with good mining practice.

It is recommended that initial trials with the new slurry blasting agent be carried out with the explosive pre-mixed

in correct proportions and density in a polythene bag. The Iron Ore Co. of Canada first used the new slurry for open-pit blasting in the Knob Lake area of Quebec. Other iron mines in Ontario and Quebec became interested and now there are a number of applications in this part of Canada.

Although blasting is a science based largely on experience, theoretical work is becoming more important, particularly in difficult applications. The new science of rock mechanics, a promising new approach to blasting, is now being studied by C-I-L physicists and technical service men who are working with mining companies to help raise the yields of ore per pound of explosive.

To apply the theoretical approach, small scale blast tests are conducted which provide valuable information for a loading pattern that will give best results. Rock mechanics is, however, still in its early stages of practical application and further refinement is still necessary before it can become a standard working tool for general use in mining.

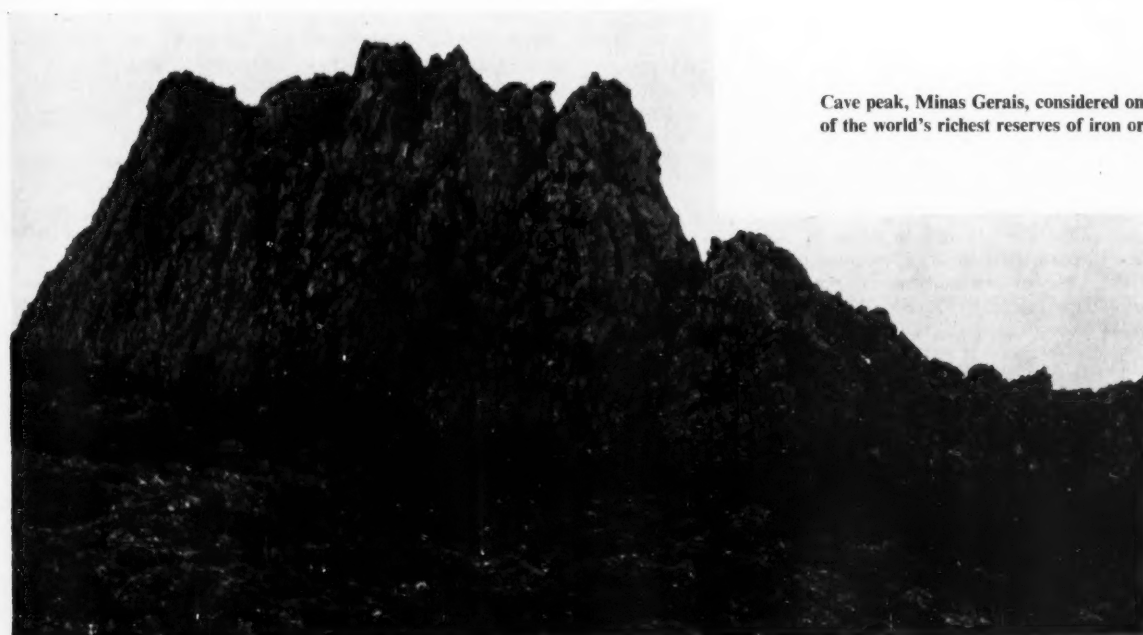
Brazilian Iron Ore in 1959

THE demand for Brazil's iron ore recovered last year, marking the end of recession in the U.S. and Europe. Combined shipments through Vitoria and Rio de Janeiro increased by 45.4 per cent between 1958 and 1959, i.e. from 2,858,911 to 4,036,072 tonnes. Companhia Vale do Rio Doce mined 4,485,547 tonnes from its Itabira deposits and exported 3,261,453, valued at \$U.S.35,812,072. Comparative figures for 1958 were 2,247,550 tonnes and \$U.S.31,507,365.

Exports of all types of iron ore from the Itabira mines this year are expected to reach 4,500,000 tonnes. Local consumption is also rising and Rede Ferroviaria Federal, the government entity which controls the federal railroads, has signed contracts to move 1,100,000 tonnes of mineral raw materials and 200,000 tonnes of finished steel products to and from the National Steelworks at Volta Redonda by

June 30 this year. To ensure the necessary railway equipment the National Steelworks undertakes to purchase 100 wagons and finance imports of six 1,800 h.p. diesel-electric locomotives for the Central Brazil railway, which serves the Paraopeba mines. Since May, 1959, compositions of 90 wagons, hauled by 4 or 6 diesel-electrics of 1,600 h.p., according to the terrain, have been transporting loads of 7,835 tonnes of mineral ores between Lafaiete and Volta Redonda.

In order to boost exports without prejudice to local market requirements and in view of the shortage of railway rolling stock, mine owners must now submit requisitions for the wagons required in advance. Considerable quantities of iron ore are reported to be awaiting transportation, either to consumers in Minas Gerais and Sao Paulo or to Rio for shipment overseas.



Cave peak, Minas Gerais, considered one of the world's richest reserves of iron ore

A new mineral quay was inaugurated at the port of Rio towards the end of last year at which ships can be loaded at the rate of 1,000 tonnes per hr. Additional facilities and equipment are now being installed so as to double the rate of loading within the next eighteen months. The special purpose of the quay is to raise export capacity from the mines of the Paraopeba Valley to 6,000,000 tonnes annually. The new quay is 1,600 ft. long and the approaches have been dredged to a depth of 40 ft.

The following countries imported iron ore from the Vale do Rio Doce company in 1959 (in l. tons): U.S., 978,997; U.K., 557,029; Germany, 508,582; Czechoslovakia, 367,617; Poland, 290,462; Japan, 192,416; Holland, 130,767; Canada, 84,279; France, 58,383; Italy, 28,369; Hungary, 13,200. The U.S. took 30.50 per cent of the shipments through Vitoria last year, and the European market, 60.87 per cent. The corresponding figures for 1958 were 31.25 and 65.09 per cent respectively.

Exports to Japan, which started in 1953 with 10,000 tons, rose to 350,000 tons last year, including shipments through Rio from the Paraopeba Valley. Japan's purchases of Brazilian ore consist exclusively of hematite, with upwards of 65 per cent Fe. Representatives of the Japanese industry told the Brazilian Mission recently that they need 12,000,000 tons of iron ore annually at present and will probably require 30,000,000 in 1970. High and rapidly fluctuating freights on iron, which have ranged from \$U.S.7.50 to \$U.S.21.00 over the last five years, restrict imports from Brazil. With a view to reducing and stabilizing freights the commercial manager of the Vale do Rio Doce company recommends the use of bigger ships and the signing of medium or long-term contracts for the freight.

The company has now drawn up plans to expand production and exports of iron ore. These include the organization of a separate enterprise, associated with experienced foreign firms, to utilize the immense reserves of itabirite, which is unsuitable for exportation in its natural form. Itabirite is an easily reduced hydrated ore, either containing fragments of hard ore, or more homogeneous. The latter type is usually of high grade and finer grain. The reserves of itabirite in Minas Gerais alone are estimated at 15,000,000,000 tons, with 30 to 60 per cent Fe. The new enterprise would instal plant to concentrate and agglomerate the itabirite, returning it to the parent company for exportation when prepared.

These soft ores have been extensively used by Cia. Siderurgica Belgo-Mineira in sintering plant since 1951, with considerable benefit as regards fuel economy and blast-furnace efficiency. They are also being utilized locally in powder metallurgy and by manufacturers of sponge iron. Vale do Rio Doce's expansion programme includes a project to build steelworks at Itabira, near the mines, to produce sponge iron and special steels.

The M. A. Hanna company, of Cleveland, which recently acquired the controlling interest in St. John d'el Rey also aims to participate in Brazil's export drive. Representatives of the company are studying the possibilities of building a railroad from the Rio das Velhas Valley to the Bay of Sepetiba, near Rio de Janeiro, to facilitate large scale exports without adding to the pressure on the central Brazil railway, the port of Rio de Janeiro and the congested suburban section of the line. The project follows closely the lines of the 1949 plan, approved by the mixed Brazil-United States technical commission, for a mineral railroad and a new port at Itacurussa, near Angra dos Reis in the state of Rio de Janeiro, at which the line now under study would terminate. The original undertaking was sponsored by Companhia Mineracao Geral do Brasil, belonging to the Jafet group, which proposed to extract 10,000,000 tons of ore annually in collaboration with the many small mine-owners in the district. The credit facilities for the project, estimated at £10,000,000, were not forthcoming and the scheme was shelved.

A CENTRAL ENGINEERING SERVICE

THE central workshop in the No. 4 (Carlton) area of the National Coal Board's North-Eastern Division is an example of how the N.C.B.'s policy for the maintenance of mechanical and electrical equipment is being carried out. It is one of twenty-one new or reconstructed central workshops throughout the coalfields which have been built according to a standard pattern. Another eight new shops are being constructed or are in the planning stage, and a further eight workshops of the older and less satisfactory type are to be reconstructed or replaced by new area workshops of the up-to-date pattern.

A new approach to the maintenance services to meet the rapid introduction of mechanization of the mines was an obvious consideration when the Board was planning the reorganization of the coal mining industry, and the policy laid down ten years ago in "Plan for Coal" has since been pursued with satisfactory results. Indeed, some 40 per cent mechanization already exists in the No. 4 (Carlton) area, and this will be increased. The type of workshop described is therefore of growing importance to Britain's coal-production plans.

History of the Project

Up to 1947 maintenance services had not kept pace with the changes in colliery methods and there was no provision for dealing with the extensive programme of colliery reconstruction which was to follow, still less was there an organization capable of dealing with the intensive mechanization which has been a feature of the past decade.

The Board decided that the servicing of equipment should take place in two stages; first, at colliery level where there would be a system of preventive maintenance and first-aid repairs, and second, by another planned system for the reconditioning, at regular intervals, of all mining and other general machinery and equipment, to be provided through the establishment of central workshops which would serve all the collieries in a given area. It was evident that the centralization of the reconditioning load must result in a reduction in costs and in an improved use of labour, machine tools and equipment. The cyclic reconditioning of equipment at a central point relieves the colliery workshops of a workload for which they are not equipped. It also enables them to concentrate on their proper task, i.e. the prevention of breakdowns by a system of planned maintenance.

Below is shown the job reception area and electrical shop. At right, on opposite page, a general view of the No. 4 (Carlton) area central workshop



ENGINEERING SERVICE IN THE BRITISH COALMINING INDUSTRY

The engineering services set up under this new system therefore provide something more than could have been dealt with at colliery level. The workshops can send out mobile gangs to supplement existing colliery resources where necessary; they give a service for the recovery, repair and re-issue of unserviceable parts; act as a centre at which defects can be investigated and modifications carried out, and also serve as a technical training unit for colliery operatives.

Cost Structure

The cost of constructing and staffing central workshops must be considered in relation to the vast engineering turnover of the coal mining industry when compared with other industries. The introduction of modern accepted principles of management techniques has been fully justified by the increased efficiency, standards of workmanship and output over those formerly existing, and comparisons between the two sets of circumstances have shown that the savings in the reconditioning of coal cutters alone have nearly met the cost of the staff necessary to operate the techniques for the whole of the workshop.

Standard costs arrived at in the erection of area workshops are based upon actual costs received in the process of working out standard workshops design. The total figure of cost per square foot works out at 52s. 6d. A typical workshop would cover about 50,000 sq. ft. Cost of the office, welfare and social block covers all essential requirements and costs about 53s. 5d. per sq. ft. These costs do not, of course, include a contingency fund or the contractors' overheads.

The central workshops have been designed around four basic units, namely, a holding centre for serviceable equipment, the reception and materials preparation centre, the productive area, and the administration and welfare block.

In the machinery stores, developed as a holding centre for both equipment awaiting overhaul in the central workshops and finished equipment awaiting despatch to the colliery, all machinery is held either on pallet racks or, if large, is stacked on the floor.

The workshops block consists of a single large working area without dividing walls or partitions. This simplifies supervision and job travel and gives flexibility, should changes in the location of any workshop section become necessary due to developments in mechanization of the mines. The workshop sections are laid out in accordance with current work flow principles, and trades are grouped to reduce noise from one side of the shop to the other, and to ensure that service sections, such as the machine shop and tool room, are located as centrally as possible.

On Wednesday last week representatives of the Technical Press visited the new central workshop in the No. 4 (Carlton) area of the National Coal Board's North Eastern Division. The shop is one unit of a planned maintenance policy designed to meet the rapid increase in mechanization experienced in the British coalmining industry. The workshops, built to a standard pattern, are described in the following article, not the least interesting aspect of construction being the modernity achieved

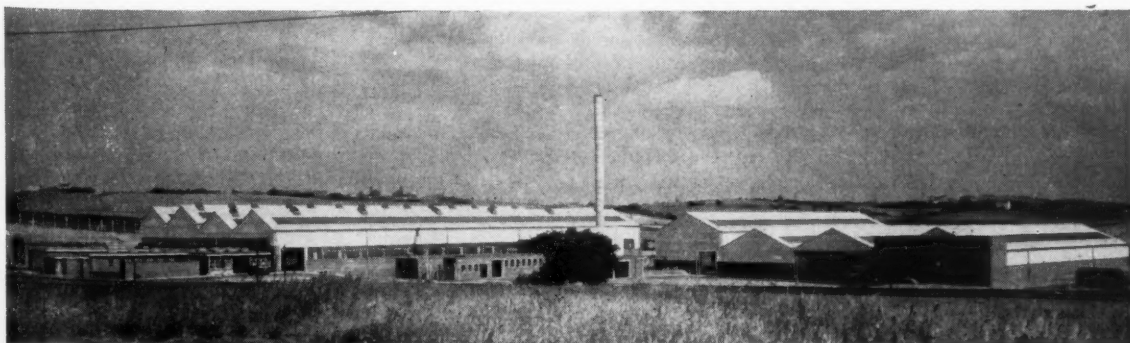
The productive area is separated from the administration and welfare block by a cross service road along which completed work can travel, via the paint shop, to the machinery stores; and from the reception area by a second cross service road which acts as a feeder for work passing into the shops for operation. Overhead cranes with capacities designed to meet maximum planned requirements are installed in each bay.

Sequence of Operation

In the job reception and inspection section all mechanical and electrical equipment coming into the shops for overhaul or repair (other than locomotives or rail wagons) is received. It is steam cleaned, stripped down, de-greased and inspected, and the balance of parts suitable for further service are held on job trolleys or pallets to await issue. Parts requiring repair are routed to the section concerned.

The various departments contained in the central workshops include an electrical shop, cable repair section, plant reconditioning and fitting shop, machine shop, workshop stores, materials preparation and covered raw materials stockyard area, job reception and storage, plating and welding sections, chain annealing and blacksmith's shops, locomotive and boiler repair bays, as well as an apprentice training school. Administrative offices are clearly divided, the entire conception being in accordance with the most modern industrial practice.

The workshops naturally are fitted out with a wide range of equipments, amongst the supplying manufacturers being English Electric, Evershed and Vignoles, Firth Brown, British Ropes, Murex Welding Processes, Hudswell Clarke and Broom and Wade.





LATEST KOLBE WHEEL EXCAVATOR IN OPERATION

SINCE the early days of strip coal mining, there has been continuous pressure for improvement in the efficiency and size of stripping equipment to move ever greater quantities of overburden at lower cost. One of the latest developments in the United States in this direction is the new Kolbe wheel excavator, which is now operating at the Cuba, Illinois, opencast mine of United Electric Coal Companies.

Capable of moving 3,500 cu. yds. of overburden an hour, digging it up to 100 ft. above the coal bed, and speeding it in a continuous stream at 1,225 ft. per minute on an endless belt conveyor a maximum distance of 420 ft. and discharging its load on the spoil bank with another 25 to 30 ft. gained in the trajectory of the falling material, this new machine is claimed to move more earth in less time than any equipment previously built in the U.S.

It was in 1943 that Frank F. Kolbe, president of The United Electric Coal Companies, conceived the idea of a wheel excavator for strip coal mining. This has been followed by fifteen years of research and engineering development work under varied weather conditions and overburden structure.

Regular Output

One of the problems associated with strip mining is the fluctuating output caused by unequal stripping depths. Moving a given quantity of overburden does not uncover a uniform tonnage of coal when the overburden thickens and as a result, the mining equipment and organization, geared to capacity production, may not be utilized to its full rating. United Electric engineers found that the shovel-dragline combination was not the most satisfactory solution to this problem. Furthermore, the instability at the top of the bank, a glacial drift, made working a dragline near an open face a hazardous operation. This same instability made it necessary to deposit the dug material at a considerable distance beyond the open pit to prevent slides. By travelling the machine on the top of the coal bed and by placing the dug material as far back as the fourth and fifth previous cuts, the Kolbe wheel excavator was found to overcome both these latter objections.

Carrying ten buckets, each of 2.5 cu. yd. capacity, but actually holding about 1.75 cu. yds. of loose material, the digging wheel of the Kolbe machine is 27 ft. in diameter. It has a speed of 8 r.p.m., which means a peripheral speed of 675 f.p.m. The wheel is powered by one 715 h.p. motor at 660 r.p.m. continuous and 1,200 h.p. at peak kW. Variable speed control permits regulation for different conditions, but 8 r.p.m. is considered the normal speed. The motor drive is a 30 in. poly-V belt which helps to provide the necessary

The Mining Journal—May 20, 1960

clutching action to protect motor and reducer against shock loads. The wheel itself weighs 90,500 lb. Complete with motor and drive it weighs 215,500 lb., while the entire digging assembly, including all machinery, weighs 476,000 lb.

Excavated material is discharged from the wheel to the belt over a roll feeder. This allows the buckets to start dumping at a low position and also permits the use of buckets of maximum width. The four rollers rotate at speeds increasing from wheel to belt, the roller nearest the belt turning at 44 r.p.m. The roll feeder construction makes it possible for material to cascade on to the belt without piling up. The belt travels at 910 f.p.m. Excavated material discharges from the ladder belt at 910 f.p.m. on to the stacker belt moving at 1,225 f.p.m.

Wide Range of Problems

Problems of many different kinds and complexities were encountered during the development of the wheel excavator. For instance, it was found that, in winter, wet material would freeze to the belts even at the theoretical maximum speed of 600 f.p.m. for rubber belts. Neither scrapers nor heating devices solved the problem, until perhaps by chance, ladder and stacker belts were speeded up to 900 f.p.m., thereby moving too fast for the material to freeze. Now ladder and stacker belt speeds up to 1,225 f.p.m. are practical.

But high speeds created other problems. In the earlier machines, a great deal of trouble was encountered with shock loads at the ladder belt to stacker belt transfer point, particularly when a 1½ ton boulder dropped 11 ft. on to a rubber belt. With high speed belts, suspension idlers and a vertical drop of 3 ft., very little trouble is now encountered in the new Kolbe wheel.

In this transfer zone of the stacker belt and the loading zone of the ladder belt, suspension idlers are held on a rubber cushion at each end that supplies additional shock resistance. Integral with the ladder are travelling skirt boards over 60 ft. long that guard against spillage in the transfer zone. As the wheel can dig from 9 ft. to 100 ft. above the coal with a widely varying angle of discharge of material from ladder belt to stacker belt, the transfer zone is a critical area.

One of the most serious problems encountered in the first three wheel excavators was the fact that large boulders and frozen chunks of top soil bounced and rolled back down the slope of the stacker belt. This problem has been completely solved by the development of rugged heavy duty suspension idlers. The ability of the idler to depress and swing forward at the same time enables it to ride with the punch of boulders and large lumps. The suspension idlers also simplify the problem of belt alignment because they adjust from off-centre loading. The stacker belt is 60 in. wide, 5-ply, 7/16 in. top cover including 5 nylon cord breakers (one longitudinal, and four bias) and 3/8 in. bottom cover including one longitudinal breaker.

Both ladder belt and stacker belt are 60 in. wide, the former being 245 ft. long and the latter 700 ft. long.

Electric power is provided by a number of motors as follows :- two motor generators at 900 h.p. each, wheel drive motor 715 h.p. at 660 r.p.m., ladder belt drive motor 250 h.p. at 1,200 r.p.m., ladder crowd drive motor 100 h.p. at 430 r.p.m., roll feeder drive motor 40 h.p. at 1,170 r.p.m., two stacker belt drive motors 400 h.p. at 660 r.p.m., two swing drive motors 35 h.p. at 700 r.p.m., and four propel drive motors 150 h.p. at 1,200 r.p.m.

Speed reducers are used as follows :- wheel drive 83.14 to 1, ladder belt drive 3.97 to 1, stacker belt drive 10.076 to 1, crowd drive 4.38 to 1, crawler drive from 1,200 r.p.m. motor speed to 14 f.p.m. The Bucyrus-Erie Co. U.S., has now been licensed to manufacture the new Kolbe excavator.

MINING MISCELLANY

According to Decree No. 218 of February 5, 1960, published in *Gaceta Oficial* No. 26,176 of February 5, 1960, the entire territory of Venezuela is a National Reserve Zone for the exploration and exploitation of aluminium and manganese ores. Decree No. 347 of August 26, 1958, is cancelled. The Decree states that aluminium and manganese are of special importance to the establishment of basic industries in the country and that Venezuela has abundant electric power available and is in a position to exploit and process essential minerals from national resources.

★

The Eire Ministry of Industry and Commerce has announced that money had been allocated for technical assistance grants towards the cost of prospecting and developing minerals by private enterprise. Where there were likely to be commercially workable deposits, and where their development was desired in the national interest, the Minister would consider applications for grants. These grants, where approved, would be limited to half of the cost, and would be confined to projects involving a total expenditure of at least £1,000. In suitable cases grants may also be given towards development work. If commercial production follows, a special royalty will be imposed to cover, as far as practicable, the amount of grant made towards the cost.

★

South Seas Mining Co. Ltd., a subsidiary of South Pacific Mines Ltd., is to commence the processing of tailings at the old Waihi Mine, in the North Island, New Zealand. The company also proposes to survey the old Sylvia Mine, near Thames and to carry out diamond drilling. Government drilling in 1937 is reported to have intersected good grade ore at the No. 4 level. The company is also interested in pyrite deposits near Thames.

★

The National Industrial Development Corporation of India has set up a subsidiary company for the manufacture of sulphur, sulphuric acid and other products from the pyrite deposits in the Amjor area in Bihar. The Pyrites and Chemicals Development Co. Ltd., which will undertake this public sector project will have an authorized capital of Rs. 50,000,000. The entire capital will be held by the company. The Corporation has engaged a Norwegian expert for studying the pyrite deposits in Bihar and recommending measures for exploitation. The estimated cost of the project will be between Rs. 60,000,000 to Rs. 70,000,000. The company will undertake the mining of large quantities of pyrites ore which would be smelted in the production of sulphur. At present India imports over 120,000 tons of sulphur annually.

★

A German mineralogist from the Salzgitter State Works, West Germany, reached Mendoza, Argentina, recently to study the production capacity of the lead, copper and manganese deposits in the province. There is a possibility that mineral treatment plants with investments of German capital will be installed.

Between eight and ten large iron and steel plants can be built in the eastern areas of the Soviet Union where the third great iron and steel centre of the U.S.S.R. is being established. The other two are in the Urals and the Donetz basin. Soviet scientists have reached this conclusion after analysing the physical resources of the area. It has been calculated that the proven reserves of cheap iron ore in Siberia and Kazakhstan will be adequate to supply the needs of 10 modern steel plants for 250 years. Ore for the plants of the new centre will be supplied from several large ore deposits containing a total of 1,800,000,000 tons. This ore contains up to 52½ per cent of iron. Some of the deposits will be worked by the opencast method. The eastern areas of the Soviet Union have the necessary reserves of coking coal, amounting to 52,000,000,000 tons (the proven reserves of this type of coal throughout the U.S.S.R. were 71,000,000,000 tons on January 1, 1958). The eastern deposits are much nearer to the surface and have much thicker seams than those of the Donetz coal basin and the production cost of coal is 33 to 50 per cent lower.

★

The Coal Council of India, which met recently in New Delhi, has expressed the view that coal target for the Third Five-Year Plan should be fixed at 110,000,000 tons — 50,000,000 tons more than the Second Plan target. The Council decided that a small committee, with the Coal Controller as the convenor, should go into the question of the pattern of production of the additional target from each of the coalfields and report to the appropriate committees of the Coal Council.

★

A Rs. 55,000,000 zinc smelter will go into operation early in 1962 at Zawar, 25 miles south-east of Udaipur in Rajasthan, to exploit the rich deposits of lead zinc ores around the place. Mr. A. C. Satta, an official of the Metal Corporation of India Ltd., has said that the Corporation had been entrusted with the task of setting up the zinc smelter for manufacturing 15,000 to 18,000 tons of electrolytic zinc, 25,000 to 30,000 tons of sulphuric acid and also adequate quantities of cadmium. The Corporation owns the lease for mining operations at Zawar. The first stage of development would be setting up by 1961 of the mining capacity of about 1,200 tons of ore a day. This will feed the proposed zinc smelter of 15,000 tons to full capacity. The mining capacity might be increased to 2,500 tons in the following three years beginning from the end of 1961. Correspondingly, the capacity of the zinc smelter will have to be doubled. India's present demand for zinc in various forms is estimated at 50,000 tons and is expected to rise to 60,000 tons by 1960-61. Zinc is not produced in the country at present.

★

Mr. Sarit Tanarat, Thai Prime Minister, has announced that he would instruct the Ministry of Industry to be strict in granting tin mining concessions. In an informal press conference he said the government would not nationalize the tin mines but only wanted more Thai nationals engaged in the industry.

The estimated value of Tanganyika's mineral exports for the first three months of this year is 136 per cent higher than in the corresponding period of 1959 at £1,911,652 against £809,634. This is largely due to increased exports of diamonds, mica, tin and lead concentrates. Diamonds of an estimated value of £1,312,803 were exported during this period, as compared with £460,285-worth last year, while gold bullion exported amounted to an estimated value of £205,787 for January to March, the March figure alone being almost double that of last year—£85,546 against £45,550. Exports of lead concentrates rose from an estimated value of £134,659 for 1959 to £337,500 for the first three months of this year, and tin concentrates from £7,966 to £16,658. Mica exports, too, rose from £8,633-worth last year to an estimated £13,309.

★

Brazil's exports of manganese ore, which dropped from 798,909 tonnes in 1957 to 695,042 in 1958, owing to the North American recession, rose in 1959 to 914,000, valued at U.S.\$30,000,000.

★

Noranda Mines Ltd. plans to reduce copper production if output continues to be excessive. It is expected that similar reductions will be made by Gaspe Copper Mines and Waite Amulet Mines.

★

With the commissioning of the 42 in. blooming mill at the Durgapur steel project in India, Associated Electrical Industries Ltd., Heavy Plant Division, has completed the supply and installation of the electrical equipment for the first of the primary mills in Stage II. It will be recalled that Stage I of the Durgapur steel project was inaugurated by the president of India on December 29, 1959, when the coke oven battery and blast furnace plant were put into service and iron produced. Stage II of the project includes the steelmaking and the production of ingots for the primary mills. The twin drive for the 42 in. bloom mill consists of two d.c. motors each of 3,000 h.p. developing a combined peak of 15,000 h.p. the normal speed range being of 40/80 r.p.m. The main mill motors are supplied by a flywheel M.G. set consisting of four 1,200 kW and two 480 kW generators driven by a 5,000 h.p. induction motor. The flywheel has a stored energy capacity of 200,000 h.p.-seconds. The 1,200 kW generators supply the main drive (two generators for each motor) and the 480 kW generators supply the bloom shear motors.

★

Important beds of easily workable phosphates have been discovered at Olinda, Brazil, on lands belonging to Cia. Paulista de Tecidos. The deposits are reported to be equal in extent to those now being worked in the district by Fosforite Olinda S.A. The latter have measured reserves of 50,000,000 tons with a 6 to 22 per cent P₂O₅ content. The company produced 250,000 tonnes of concentrates last year and is now increasing capital to 500,000.00 cruzeiros in order to expand annual capacity to 350,000 tonnes.



It is reported from Malaya that the Perak Iron Mining Co. is to install, at a cost of \$1,500,000, a 1,800 ft. conveyor belt to enable a direct shore-to-ship loading of ore at Lakut. Loading now takes place at Prai by lighter, but this is slow and expensive. The ore will now be conveyed the 66 miles to Lakut by road.

The Steep Rock dredging operations of Caland Ore Co. Ltd. at Steep Rock Lake, Ontario, were described in our issue of August 7, 1959. The operation has now been dedicated. Shown above at left is the Lime Point opencast stripping operation, together with the conveyor installation. The illustration at right depicts the Falls Point mine headframe

Borings for molybdenum, which were commenced at Mestersvig, Greenland, last year, are to be continued in the coming summer in the hope that remunerative deposits will be found.

It is reported from Brazil that the National Institute of Nuclear Energy, attached to the Sao Paulo University, has produced atomically pure uranium from local raw materials for use in nuclear reactors. A small pilot plant has been operating since early this year at the Institute, and another with initial monthly capacity of 250 kg. capable of being increased four-fold, will be inaugurated soon. The Nuclear Energy Commission has consulted Kennedy and Donkins regarding the construction of a central plant of 150,000-200,000 kW. on the river Mambucaba, between Rio and Sao Paulo.

At their annual meeting recently, The Cornish Institute of Engineers were told by Mr. L. G. Brown, who presided in the absence of the president, that they should aim at increasing their membership. Mr. C. W. Walker was elected president for the next year.

A leading Japanese geologist, Professor Tatsumi, who recently arrived in Singapore in the Japanese Antarctic expedition ship returning from a scientific voyage to the South Pole, stated that they had discovered an abundance of uranium under the Antarctic ice, where coal and other valuable mineral deposits were also located.

The Turkish Government has commissioned the Canadian Aero Service of Ottawa to make a resources inventory, costing \$850,000. The survey, based on Ankara, and scheduled to last 18 months, will examine 100,000 sq. miles, using Gulf type airborne magnetometers and specially designed scintillation counters.

Caland Ore Co., a subsidiary of Inland Steel of Chicago, recently dedicated its mining operation near Atikokan, Ontario. The site will become the company's largest producer in the Great Lakes region when it reaches a yearly capacity output of 3,000,000 tons by 1969. Caland is currently mining iron ore by the open pit method until development, already well advanced, permits underground mining to begin in 1963. The company expects to ship 750,000 tons of ore this year. At its capacity operations of 3,000,000 tons a year, Caland will supply one-third of Inland's iron ore needs, and will be the company's largest source of supply.

The discovery of a rich bentonite deposit said to be 180 in. thick has been reported near Parys, in the O.F.S. The richest deposit of bentonite so far discovered in the world is situated in the U.S. The American deposit is 30 in. thick.

The Great Canadian Oil Sands company has applied to the Alberta Conservation Board for approval of a \$100,000,000 project to mine, process and market synthetic crude oil and by-products from the Athabaska oil sands, and the application will be heard on June 8. The sands, reputed to form the world's largest great single reserve of crude oil, contain an estimated 300,000,000,000 bbl. of retrievable oil, but extraction has so far been unsuccessful. It was announced last October that Richfield Oil, of Los Angeles, were putting up \$1,500,000 required for an atomic explosion under the sands, to try freeing the oil by heat. Great Canadian Oil Sands' project would involve a strip mining process by crawler-mounted bucket wheel excavators; a water flotation process to separate oil, and transportation by 16-in. pipeline to connect with the Inter Provincial Pipe Line system at Edmonton, 175 miles away. The company hope to be producing oil by 1963.

The important Chilean copper mine, El Rosario of Andacollo comprising 500 claims in the province of Coquimbo, has been acquired by the Compania Minera Tamaya for \$U.S.2,000,000. The deposit is 150 ft. thick, the average grade of copper being 2 per cent. The Andacollo Co. has acquired options on the gold and copper mines El Sauce and Pajonales in the same district for three years. Compania Minera Santa Fe, also in Coquimbo Province, is buying more heavy equipment for its iron ore mines, at El Pleito and Dorado, to improve production of high grade ore. The company recently purchased from Britain 12 Aveling-Barford dumpers, 31 Euclid trucks and a conveyor transporting system for loading ore.

The Societe Denain-Anzin of Paris is reported to be exploiting the first deposit in France of giobertite, a native magnesium carbonate found in the communes of Larurns and Saint-Engrace, south-east of Pau, Basses-Pyrenees. Giobertite is used in preparing refractory materials for protection, coating or lining blast furnaces and kilns, and French ironworks and metallurgical industries have previously imported it from Austria.

Union Minière du Haut Katanga announced that their new Luilu copper and cobalt electrolysis plant near Kolwezi in the Belgian Congo, came into operation on May 17. The plant will have an annual production capacity of 50,000 tons copper and 1,750 tons cobalt in its initial stage to be increased some time next year to 100,000 and 3,500 tons respectively.

The Taiwan Power Co. of Formosa may have an atomic plant of 200,000 kW., costing \$U.S.50,000,000 by 1965. The erection of such a plant is considered necessary owing to the limited coal supplies in Formosa.

Early last month the Guatemalan Ministry of Economy announced that returns from mining operations had been increasing for some time. Five per cent royalties are paid to the government on all minerals extracted in accordance with lead and zinc mines owned by Compania Minera de Guatemala and the resumption of exports of concentrates, are the main factors responsible for the increase. Further news is that primary uranium deposits were recently found in the country. The discovery follows geological investigations carried out in several areas. **The seams spread from the Mexican border in two directions; one towards Ixcán in the Department of El Quiché, and the other towards the volcanic area in the Department of San Marcos.**

Mitsui Bussan, of Japan, has announced that six leading copper smelters are shortly to conclude negotiations to import between 96,000 and 144,000 tons of copper concentrates from Haiti over the next four years.

Companhia Siderurgica Vatu has been organized in Brazil with an initial capital of 600,000,000 cruzeiros, the majority of the shares being held by Cia. Comercio de Ferro Itabira, to industrialize the fines from the Itabira mines. Vatu will specialize in powder metallurgy and the production of sponge iron by the Swedish Regenaos process on a one per cent royalty basis. Production is scheduled to start early next year at the rate of 50,000 tonnes annually, rising to 100,000 tonnes in 1962. Equipment valued \$U.S.3,000,000 is being imported from Sweden.

A crushing and screening plant owned by the Sierra Leone Development Co. Ltd., is producing about 400 tons per week of crushed, granite type material for use as railway track ballasting in Sierra Leone. The plant, made by Frederick Parker Ltd., is sited near the 3 ft. 6 in. gauge, 52 mile railway of the Sierra Leone Development Co. Ltd. The railway carries iron ore from the Marampa mine to the port of Pepel. Stone for the plant is won by drilling and blasting

According to a recent French Press report, the Geological and Mining Survey Bureau of the French Government is surveying an area of 2,650 hectares (about 6,500 acres) in the Creuse and Allier Departments for lithium. Included in the area is Soumans, a commune near Boussac north-east of Gueret, the capital of the Creuse department. This is the first survey for lithium to be conducted in France.

Turkey plans to expand coal production at the Black Sea coast works at Zonguldak to produce from 7,000,000 to 10,000,000 tons annually, in order to meet extra demand, estimated at 1,800,000 tons annually, from the iron and steel works to be established at Ereğli. Average monthly production from Zonguldak was 545,847 tons in 1958.

During 1959 Angola produced 18,510 tonnes of copper as compared with 14,940 in 1958. 1,015,690 ct. diamonds (1,001,240), 35,670 tonnes manganese ore (34,930), 348,980 iron ore (287,200) and 3,160 tonnes manganese iron ore (13,940).

The world's largest copper rod rolling mill has been opened at Prescott in Lancashire, by Mr. Maudling, President of the Board of Trade. The mill is owned by British Insulated Callender's Cables Ltd. It was designed by the company's technicians and the Brightside Foundry and Engineering Co. Ltd. to meet a capacity of 400 tons per day. The mill cost £1,500,000 and is operated by a crew of only four men.

Advocate Mines, during their annual meeting recently, in Toronto, announced that they had recommenced operations in the test plant at Baie Verte, Newfoundland, asbestos property to get additional milling data on open pit ore. This test is expected to produce around 400 tons of fibre to be used in asbestos cement products. The company has 21,000,000 tons of proven ore in two zones to a depth of about 450 ft., and planning is proceeding including erection of a 3,000 ton-per-day plant.

Large bauxite deposits were recently reported in Venezuela's Gran Sabana area of Bolívar State, but the grade was not known. Small deposits estimated at 1,800,000 tons were previously found in other parts of the state and also in Delta Amacuro Territory, the latter showing 35 per cent bauxite. The Venezuelan Minister of Mines and Hydrocarbons, has received requests from Canadian, Italian and Japanese interests to develop industries from the natural resources of Guayana, and Reynolds Metals, and other foreign interests have submitted propositions for the installation of a bauxite processing plant.

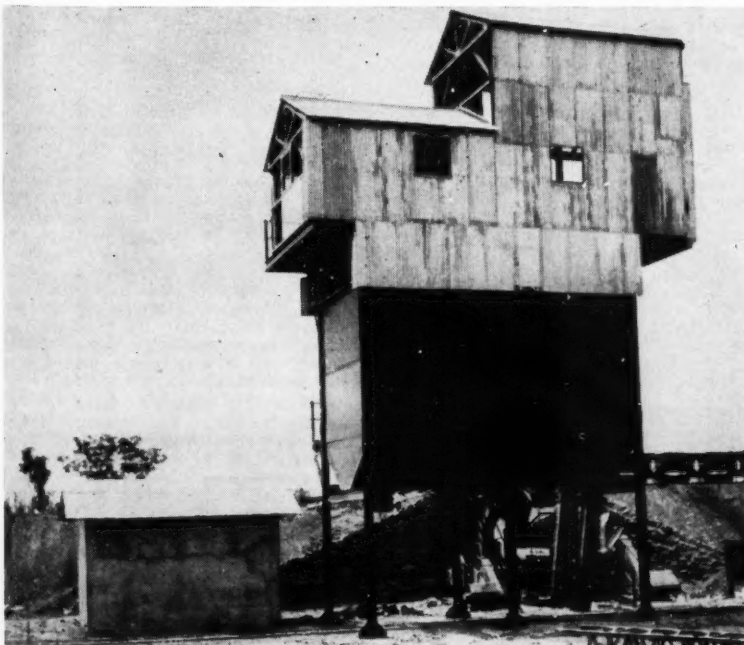
The U.S. firm, Chemalloy Minerals is reported to be embarking on an extensive mine development programme for pollucite, with \$400,000 received from an underwriting.

The U.S. Department of the Interior Geological Survey have announced the release on open file of total intensity aeromagnetic profiles for parts of Kobuk, Minchumina, Cape Espenberg, Cape Lisburne and Brooks Range areas of Alaska.

On May 10 members of the Southern Counties Institute of Mining Engineers visited the Fraser and Chalmers Engineering Works of The General Electric Co. at Erith.

Cia. Industrial e Mercantil Inga, Brazil, has ordered a silicon rectifier of 6,800 amps., 440 v. to be installed in its metallic zinc producing plant at Itagui, Rio de Janeiro (See *The Mining Journal*, February 6, 1959). Alternating current will be converted into high-tension continuous current, facilitating the economic refining of zinc by electrolytic processes. The rectifier, to be built in Brazil by Electromar, was designed by Westinghouse Brake and Signal Co. of London.

American Zinc, Lead and Smelting Co. and a wholly-owned subsidiary of Consolidated Gold Fields of South Africa Ltd., a London company, have worked out an arrangement for mining zinc on mineral lands controlled by American Zinc in Tennessee. According to a joint announcement, the agreement will involve the investment of \$3,000,000 to \$4,000,000 by Tri-State Zinc Incorporated, operator of zinc mines in Illinois and Virginia. Tri-State is a wholly-owned subsidiary of Gold Fields American Development Co. Ltd. which, in turn, is wholly owned by Consolidated Gold Fields. It is anticipated that when mine development in the Newmarket, Tennessee area is completed, annual production will reach 35,000-40,000 tons of zinc concentrates.



Flameproof Mines Tractor

Over twenty years ago the Hunslet Engine Co. pioneered the use of flameproof diesel locomotives in safety lamp mines. To meet the need for a general purpose machine suitable for operation in the limited space, Hunslet have now produced a compact flameproof 25 h.p. rubber tyred four wheel drive tractor, the first flameproof tractor in service in a British colliery.

The tractor is fitted with slew steering, which allows great manoeuvrability and precision of control, enabling it to operate alongside without damaging either the conveyor or the pit arches. Acute corners can be negotiated, turning radius being only 5 ft. 6 ins. This type of steering obviates the need for a differential lock and also facilitates the use of a variety of ancillary equipment which can be supplied with the tractor.

The tractor is controlled by a throttle, a forward/reverse selector and two levers, each of which operates the brakes on a pair of wheels. The controls are conveniently arranged for use from alternative driving positions, one for each direction of travel. With this arrangement the driver can always face the direction in which the tractor is moving thus facilitating steering and eliminating blind spots.

A Perkins Three 152 watercooled three cylinder diesel engine, with chromium plated liners and mechanical governor, is incorporated, derated to develop 25 h.p. nett at 1,650 r.p.m. The engine is started by an hydraulic starter. Transmission from the engine is through a torque converter to an epicyclic forward and reverse gearbox, then through reduction and transfer gearing, multiple clutches and worm drives. The worm drives are incorporated in each wheel. This transmission system facilitates the servicing of clutches, brakes and final drive and enables a four wheel drive tractor with large diameter tyres to be built down to a width of 3 ft.

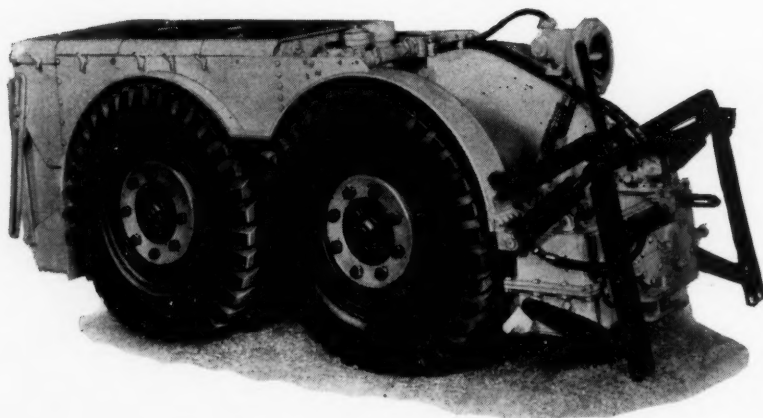
The stainless steel exhaust gas conditioner is constructed on the Hunslet jet principle to ensure maximum cleansing of the exhaust gases and safety of operation even when working over undulating ground. An exhaust conditioner low water level engine shut-off device is fitted and the whole of the exhaust system, including the conditioner, is water jacketed. The gases from the conditioner are diluted with air from the fan before exhausting to atmosphere.

The tractor is of particularly rugged construction and any load likely to be encountered in the pit can be superimposed on the tractor as the total load capacity of the large diameter power grip tyres is over 12 tons. Alternatively, the load can be hauled on rubber tyred trailers, which follow accurately in the path of the tractor, or on steel skid pans. The skid pans can conveniently form a baseplate for pallet loads and in addition, can be quickly converted into articulated trailers.

The basic tractor incorporates an hydraulic pump and the frame is designed for the attachment of an hydraulic linkage to which the following items are quickly fitted; angledozer, lowlift shovel 2 tons capacity, fork lift 2 tons capacity, crane, articulated trailer coupling, skid pan coupling. In addition winches are available driven through the torque converter or by the hydraulic pump.

The Hunslet MT.25 was developed as a basic multi-purpose tractor for material handling, development work and recovery duties underground. It is obvious that such a versatile and flameproof machine is also ideally suited for numerous duties on the surface, especially where there are space limitations. The principal dimensions are: length over drawgear, 8 ft. 11½ ins., width overall, 3 ft. 0 in., Height overall, 3 ft. 5 ins., carrying capacity, 27,000 lbs. (tractor), drawbar pull at starting, 4,200 lbs., and weight in working order, 5,500 lbs.

Below, is the Hunslet MT 25 fully flameproof diesel hydraulic mines tractor. This rubber-tyred four wheel drive unit is the first flameproof tractor in service in a British colliery. At right is an electric submersible borehole pump of the range manufactured by The Pulsometer Engineering Co. Ltd.

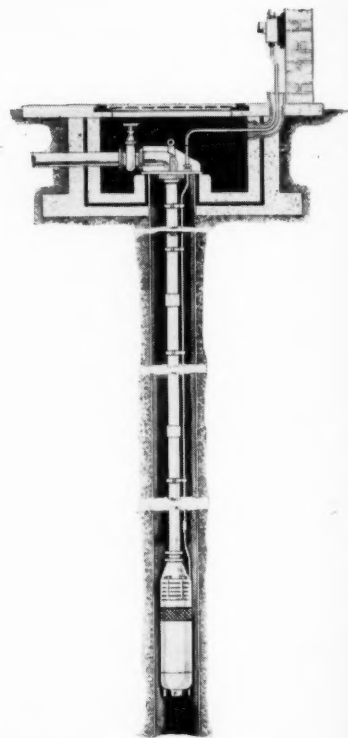


The Mining Journal—May 20, 1960

Maximum gradients with 4,500 lbs. superimposed load are 1:3 at 1.3 m.p.h. and 1:5 at 3.4 m.p.h.

SUBMERSIBLE BOREHOLE PUMPS

The range of electric submersible borehole pumps by The Pulsometer Engineering Co. Ltd has been increased to provide capacities of up to 50,000 g.p.h. at depths down to 500 ft. below ground level. These pumps, designed for boreholes not less than 6 in. dia., are light in weight and as no alignment or careful fitting is required and no foundations are necessary they can be installed quickly and cheaply.



The pumps are of the centrifugal type and can be single or multi-stage according to the application. The cells of the multi-stage pumps are flanged and bolted together. The diffuser passages are cast in the cells. The bronze impellers are keyed to a steel spindle which is protected by bronze sleeves and runs in grease lubricated bearings. Renewable bronze wearing rings are fitted on the casing where impellers are in running contact and bronze centre bushes are provided between the cells.

Provision is made to prevent sand entering the motor and lubricant escaping into the water and a strainer plate is fitted round the suction intake which is between pump and motor. A non-return valve is incorporated in the pump delivery chamber.

The motor, which can be either single or three phase, is bolted direct to the pump by a spigoted flange and is connected to it by a rigid coupling. The starter is mounted at ground level and can be of the hand or automatic pattern operated by a float gear, pressure switch,

The M

The

time sw
control.

The
borehole
mining

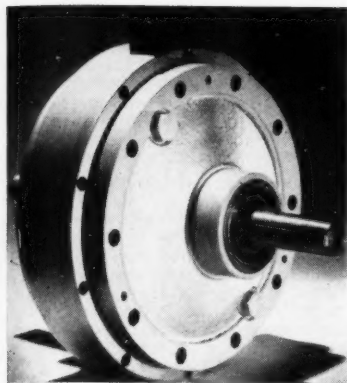
MAGN
COUPL

Manu
use is
coupling
Sons (I
electro-
in whi
through
energize
outer r
achieved
and stat
all tech
snatch
it has t
on pick-
solid dr
condition

The
and acc
of the
independ
torque f
slip wi
valuable
On the
tions o
character
tensioni
Mode
torque c

DUST

An u
oxide d
types
in Pol
by a fa
an acc
stalled
The air
opposite
the sou
are settl
while a
into a c
the du
stream.
containe



The Smith's industrial magnetic particle coupling

time switch or other form of remote control.

The Pulsometer electric submersible borehole pumps have applications in mining and other industries.

MAGNETIC PARTICLE COUPLING

Manufactured especially for industrial use is the industrial magnetic particle coupling manufactured by S. Smith and Sons (England) Ltd. This unit is an electro-magnetic form of drive coupling in which the torque is transmitted through a ferrous powder which under energized conditions links the inner and outer rotor so that a solid drive is achieved without slip. Since the dynamic and static coefficients of friction are for all technical purposes the same, no snatch on pick-up can take place. Thus it has the resilience of a fluid fly-wheel on pick-up, linked with the stability of a solid drive device under normal running conditions, without any slip.

The torque is a direct function of, and accurately controlled by, the value of the exciting current and is entirely independent of speed. If, however, the torque for a given excitation is exceeded slip will take place, thus providing a valuable safety feature against overload. On the other hand, within certain limitations of heat dissipation the slip characteristic can be put to good use in tensioning devices.

Models ranging from $\frac{1}{4}$ lb.ft. 211 lb.ft. torque capacity are available.

DUST COLLECTOR

An ultra-sonic dust collector for zinc oxide dust, probably applicable to other types of dust, has been designed in Poland. Dust-containing air is blown by a fan into a tower where it passes an acoustic field formed by a siren installed in the upper part of the tower. The air flows through the tower in the opposite direction to allow spreading of the sound waves. Most dust particles are settled in the lower part of the tower, while a small portion is blown by air into a cyclone (low-pressure area), where the dust is separated from the air stream. Below the cyclone there is a container for the removed dust.

Technical Briefs

Use of Cyanide Leaching To Extract Copper From Zinc Concentrate

As well as being a good solvent for gold and silver, cyanide is also a good solvent for many base metals minerals, particularly most of the copper minerals, and the mining chemicals laboratory of American Cyanamid Co. has recently studied the possibility of using cyanide solutions for leaching base metals.

In the case of a sphalerite, concentrate tests indicated that the copper content was lowered from 0.05 to 0.013 per cent by leaching for 15 minutes with a solution containing the equivalent to 0.25 per cent NaCN. At the same time, the amount of zinc extracted was insignificant.

The cyanide was regenerated by acidification with sulphuric acid and about 45 per cent of the copper was found as a precipitate containing CuCN and CuCNS, the remaining 55 per cent being present as copper sulphate.

It was calculated that the reagents required for such treatment were 0.5 lb. NaCN (or its equivalent) 2.5 lb. H₂SO₄ and 3.0 lb. NaOH (or 2.1 lb. CaO) per ton of zinc concentrate treated whilst the equivalent of 3.1 lb. of CuSO₄ .5H₂O was produced per ton of concentrate.

The process may have useful application in cases where sphalerite contains inclusions or exsolution bodies and being small in size excludes complete elimination by other means. In the case of the sphalerite, tested by Cyanamid, the copper occurred as chalcopryrite (one of the least soluble of the copper minerals) and was largely as particles less than 20 microns in size, some of which were attached to the sphalerite.

NUCLEAR ENERGY FOR COAL GASIFICATION

The U.S. Bureau of Mines has developed a pressure-process for the continuous production of synthesis gas from coal, steam, and oxygen. Only coal and steam are needed to produce synthesis gas, but oxygen is provided for the combustion of a certain amount of the coal to supply heat for the endothermic steam-coal reaction. The additional cost of the coal and the oxygen, including the cost of oxygen compression, makes the gasification process uneconomical at present. If an economical process is to be developed, cheaper heat must be obtained from other sources.

An attractive potential source for the energy required is heat from nuclear fission. As part of a Bureau investigation of the application of heat from nuclear fission to coal gasification and chemical processing, a simulated-nuclear system has been designed and constructed in which heat is produced by electric induction to circumvent the complications of radioactivity. Heat—generated within

a bed of graphite spheres that simulate nuclear fuel-elements—is transferred to a pressurized stream of recycled helium gas, which, in turn, can heat chemical processing streams to 2,000 deg. F. Having demonstrated the feasibility of gasifying sub-bituminous coals and lignite in alloy-steel tube-coil gasifiers at about 1,800 deg. F., the Bureau conceives a "nuclear-energy" gasifier as the heat exchanger in this system. The operating temperature of the gasifier need not exceed 1,800 deg. F. for low-rank coals, but higher temperatures indigenous to process-heat reactors would materially aid the process.

ARALDITE-BASED SILVER PREPARATIONS

Johnson, Matthey and Co. Ltd., announce that research work carried out in collaboration with CIBA (A.R.L.) Ltd. has led to the development of two additions to the JMC range of thermo-setting silver preparations. Both these preparations are based on Araldite.

FSP43 is a surface-coating preparation for application by brushing; FSP49 is a conducting cement. Each is supplied in the form of two separate components which are mixed together immediately before use.

The mixed components must be cured at a minimum temperature of 80 deg. C. and will adhere to most materials that are capable of withstanding this temperature, including glasses, ceramics, graphites and many plastics. The films, after curing, are extremely hard, have high electrical conductivities and are highly resistant to water and organic solvents. Moreover, the film produced by FSP43 can only be electroplated in many conventional acid baths.

Both preparations are protected by British Patent 716243.

PRODUCTION OF SELF-FLUXING PELLETS

Owing to the increase in the use of the beneficiation of iron ores, necessitating fine grinding, pelletizing has become a necessity with many ores. For example, the Minnesota magnetic taconites must be ground to about 80 per cent — 325 mesh to yield a suitable concentrate. The production of self-fluxing sinters, however, has many advantages and it is now reported that batch and pilot plant tests have provided enough information to permit operators to proceed with some confidence towards this goal. There are some precautions, however, which must be taken. High temperatures can form "chunks" or build-up in walls in the furnace but satisfactory pellet strength can be obtained.

Metals and Minerals

Consumption of Vanadium Rises

Consumption of vanadium in the U.S. was 50 per cent greater in 1959 than in 1958, reports the Bureau of Mines, U.S. Department of the Interior. Statistics believed to represent about 90 per cent of the total consumption give a figure of 3,776,400 lb. for 1959, which compares with 2,517,677 lb. in the previous year. The steel industry consumed a total of 3,128,169 lb. last year, gray and malleable castings accounted for 49,710 lb., non-ferrous alloys for 241,592 lb., and chemicals for 269,525 lb. It is noteworthy that consumption of vanadium in the U.S. in December, 1959, was 26 per cent greater than in November.

There were no imports of vanadium ore and concentrates in 1958; however, 10,129 lb. (V_2O_5 content) were imported in 1959. Imports of other forms of vanadium in 1959 totalled 32,047 lb. (gross weight) compared with 1,500 lb. in 1958.

U.S. production of vanadium pentoxide is estimated to have increased to approximately 15,900,000 lb. (gross weight), containing 14,000,000 lb. of V_2O_5 in 1959, from 10,939,200 lb. (gross weight) containing 9,965,000 lb. of V_2O_5 in 1958. Vanadium pentoxide from domestic ores was produced at 4 plants in 1959 and 3 plants in 1958. Ferro-vanadium was produced by two companies in both years. The Bureau of Mines is not at liberty to publish the output figures, but production in 1959 was approximately twice that of the previous year.

Production of vanadium in the Union of South Africa was begun in 1957 by Mineral Engineering Co. of South Africa (Pty.) Ltd. in the Transvaal. Output amounted last year to 535 s.tons, all of which was shipped to Europe, mainly to the U.K. In early 1960 the Anglo American Corporation of South Africa took an interest in this development and a marked increase in output is anticipated. A new South African producer, known as African Vanadium and Allied Industries (Pty.) Ltd. appeared in early 1960, making about three tons per day of red mud cake for shipment. It is planned eventually to process this to vanadium pentoxide and salts before shipment.

There was also a considerable increase in the output of South West Africa, where operations were expanded at the Berg Aukas mine of the South West Africa Co. This 1959 output of lead-vanadium concentrate reached 8,025 s.tons, containing an estimated 700 tons of recoverable vanadium, compared with 4,856 s.tons of concentrates in 1958 containing 435 tons of vanadium in 534 tons of oxide. The current level of production is believed to be about 10,000 tons of concentrate per annum.

★

Minerals Engineering Co., of Grand Junction, Colorado, has signed a five-year contract with Food Machinery and Chemical Corporation to take the latter company's by-product vanadium as a raw material for vanadium pentoxide, to be used as a catalyst for motor car smog control units. These units would be placed in auto mufflers to purify ex-

haust products. This new field for vanadium has obvious potentialities for large-scale expansion.

GALLIUM COMPOUNDS

Gallium compounds, which have unique semi-conductor and photoelectric properties, have been under investigation by several electronic metal laboratories, reports the American Metal Market. Gallium metal sells for around \$1,300 per lb. Leading producers are Alcoa and the Eagle-Picher Co.

The U.S. Army Signal Corps is reported to be interested in gallium compounds for transistor devices, solar batteries and related apparatus, which may be applied in both ground and air equipment.

Bell Telephone Laboratories has announced significant progress on growing single crystals of transparent gallium phosphide, which is expected to lead to a new basic understanding in the science of semi-conductors. The transparency will make it possible to observe certain results of the effect of varying conditions, such as "doping" or the addition of metal impurities. This development work may also lead to new studies on other semi-conductor metals such as arsenic, indium and antimony.

It is possible that further investigations might have an important relation to thermoelectric metal compounds which are used in cooling devices, and that it might pave the way for a new type of household refrigerator without moving parts.

FALCONBRIDGE IN DOMINICA

Falconbridge Nickel Mines hopes to build a pilot plant in the Dominican Republic to provide technical and economical data on the possibilities of putting into production lateritic nickel bearing properties in that country. At the company's annual meeting the president, Mr. H. J. Fraser, said that exploration in the Republic had disclosed lateritic deposits of greater tonnage and nickel content than the company's reserves in the Sudbury district of Ontario.

Falconbridge's target output of 27,500 s.tons of nickel was reached last year for the first time since the beginning of the company's expansion programme in 1953. In the fourth quarter output of the smelter exceeded the annual rate of 32,500 s.tons and that of the refinery exceeded 32,000 s.tons. A further record is expected this year.

Mr. Fraser also reported that sinking of the first development shaft at Strathcona was getting under way. This property is in the Levack area, 30 miles N.W. of Sudbury and lies a few miles N.E. of the Fecunis Lake operation. It will take five or six years to get Strathcona into production, but the potentialities of this property were indicated by Mr. R. C. Mott, vice-president of Falconbridge, who stated that the company had been looking into the possibility of bringing the mine in at a rate of either 4,000 to 6,000 tons per mining day.

A new mining operation, the Clarabelle Open Pit, is to be started by International Nickel on an outcropping orebody in the Clarabelle and Lady Lakes area to the S.W. of the company's Murray Mine in the Sudbury district of Ontario. This was announced by Mr. Ralph D. Parker, senior vice-president, during a recent visit by the directors to the company's mines and plants in the Sudbury district. The Clarabelle is scheduled to go into production in the latter part of 1961 as part of the long-range programme to maintain the continuity of Inco's operations in the Sudbury district. Production from the new pit will not increase the company's overall output, but will replace tonnage now being obtained from other sources.

★

The French producer Société Le Nickel and the trading firm Minerais et Métaux have announced the formation of a joint company to sell nickel. The new company—Société de Vente de Nickel—will sell the metal in the form of ores, concentrates, matte, castings, ferro-nickel and alloys. It will also handle chrome and iron.

U.S. GRAPHITE IMPORTS

The U.S. Senate has passed and sent to the White House a Bill extending for two years the duty-free importation of amorphous graphite valued at \$50 a ton or less.

CANADIAN TUNGSTEN

Canada Tungsten Mining Corp. is expected to start this season's drilling operations about the middle of May. The programme embraces both detailing and delineation of the main tungsten deposit, on which earlier drilling indicated 1,166,351 tons grading 2.18 per cent WO_3 , and also an investigation of other known showings. A programme of geological mapping covering the entire property of 83 claims is to be undertaken. It is estimated that about 500,000 tons will be readily available for open pit mining.

Metallurgical tests are continuing. According to *The Northern Miner*, the ore contains no bad impurities and it is possible to obtain a good grade of concentrates on tables and recover the balance of the recoverable values by flotation. Table concentrates running up to 70 per cent WO_3 have recovered about 60 per cent of the values.

Tentative planning is based on an operational rate of 300 tons per day with the possibility of providing mill capacity of up to 500 tons daily. The size of the plant will be governed largely by the markets for high grade tungsten concentrate. The company hopes to be far enough advanced to bring in equipment for mill construction in 1961.

★

At the annual meeting of the American Ceramic Society in Phila-

The M

delphia, coatings structural tempera F. In the tors us refractor with a h ing syste tion for cess pro efficient strength

ANTIM

The U modity o have narter tobacco the tol mark, w other th the lat the anti will be Co. an stockpil

ZIRCO

The nounced having able ev the tempo until J Duties Order, on Ma decision

A re space Electro Californ in Linc and ha plant near E ing mi the ric a new grade ore wh and ec used in down metals, industr

WOLF

Wol indicat c.i.f. E previou busines at pri the to

RECO

U.S. largest in the ductio strikes 8,269, 6,950, ports Statist 1959,

delphia, it was reported that ceramic coatings could protect high temperature structural strength of tungsten at temperatures of more than 3,000 deg. F. In the method described the investigators used a vitreous type bonded refractory in which zircon was bonded with a high temperature glass. This coating system protected tungsten from oxidation for up to 10 hours at temperatures which exceeded 3,000 deg. F. The process provides materials engineers with an efficient means of utilizing the high strength properties of tungsten.

ANTIMONY FOR TOBACCO

The U.S. Government Agency, Commodity Credit Corporation, is reported to have completed arrangements for the export of about \$500,000 worth of tobacco for 850 tons of antimony ore. The tobacco will be shipped to Denmark, which will send fish or machinery, other than farm machinery, to Mexico. The latter country in turn will export the antimony ore to the U.S., where it will be processed by the National Lead Co. and placed in the supplemental stockpile.

ZIRCONIUM SPONGE IMPORTS

The U.K. Board of Trade has announced that Her Majesty's Government, having carefully considered all the available evidence, have reached the conclusion that zirconium sponge should be temporarily exempt from import duty until January 1, 1961. The Import Duties (Temporary Exemptions) (No. 5) Order, 1960, which came into operation on May 14, 1960, gives effect to this decision.

A report from Idaho states that a space age metal processing company, Electro-Nuclear Metals of Roseville, California, is locating a \$2,000,000 plant in Lincoln County to process zirconium and hafnium. Ore will be hauled to the plant for processing from a property near Escalante, Utah, where it is being mined from a deposit claimed to be the richest known source of zirconium and hafnium in the world. The firm has a new process for extracting pure reactor grade zirconium and hafnium from the ore which is reported to be more efficient and economical than the methods now used in industry. It is expected to bring down the costs of producing the pure metals, thus broadening their uses in industry.

WOLFRAM RISES

Wolfram ore shipment prices are now indicated at 147s. to 152s. per 1-ton unit c.i.f. Europe, being a rise of 1s. from previous levels. A certain amount of business is reported to have been done at prices varying from the bottom to the top end of the range.

RECORD U.S. SILVER OUTPUT

U.S. refiners produced in March the largest amount of silver for any month in the past 17 years. Making up for production losses in late 1959 because of strikes, domestic producers turned out 8,269,000 f.o.z. up sharply from the 6,950,000 oz. produced in February, reports the American Bureau of Metal Statistics. Refined silver output in March, 1959, amounted to 6,910,000 oz.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

It has again been a week in which new interest has been on a restricted scale, and whilst the volume of business as reflected in the daily turnovers has shown an increase, this can be attributed to some extent to dealers arranging day to day adjustments in their market positions. Whilst early in the week a less assured tone was evident in the copper market, values overall have shown little change during the period under review.

COPPER PRICES RECOVER

Figures issued during the week by the Copper Institute give the following details:

	U.S.		World	
	April	March	April	March
Refined Production ...	153,053	131,308	173,538	172,195
Deliveries to fabricators ...	129,663	126,766	188,984	180,796
Stocks ...	63,373	61,598	246,562	239,192

Although the meeting scheduled for the end of last week between Anaconda Copper Co. and Union representatives was postponed over the weekend, a generally more favourable view has been taken on a settlement not being long delayed in the two weeks' old strike at the company's El Salvador and Potrerillos smelter. When talks took place at the beginning of the week the Union put forward a counter proposal of a 58 per cent wage increase, but this was rejected by the company and negotiations broke down although attempts are continuing behind the scenes to find a new basis for an agreement. Meanwhile, the threatened sympathetic strike by workers at the Braden and Chuquimata mines has not materialized, but in view of the impasse reached in the present negotiations, the possibility of such a strike being called cannot altogether be ignored. In the Copperbelt area in Northern Rhodesia conditions are reported to be more settled.

Whilst prices in London have been inclined to drift lower in the absence of any revival of consumer interest in expectation of a further rise in warehouse stocks which, although somewhat less than expected, increased 190 tons bringing the total to 3,489 tons and resulted in a further narrowing in the backwardation, it is clear that if the situation in Chile does not resolve itself as expected, the nearby quotation will in all probability be liable to be the most affected. Subsequently, however, an upward movement developed mainly attributable to political developments and disappointment over the complete failure of the summit talks in Paris.

In the U.S., customs smelters still find consumer demand slow for June copper at 33 c. and the export market quiet, whilst the producer price at the same figure is well maintained with satisfactory sales for June delivery. The scrap price basis No. 2 wire is currently quoted at ½ c. lower at 24.25 c. with offerings on a limited scale. The Belgian producer price has again been lower and now stands at the equivalent of 31.075 c. New York/Antwerp.

HIGHER SHIPMENTS FROM PENANG

The tin market has been uneventful and whilst some improvement in consumer interest on both sides of the Atlantic was noted earlier in the week, only a small amount of actual business resulted. U.K. official warehouse stocks increased 101 tons to 7,963 tons. Tin shipments from Penang in the first half of May showed a substantial increase at 3,138½ tons compared with 1,588½ tons in the first half of April, whilst from Singapore there was a nominal shipment of ½ ton compared to 1½ tons.

On Thursday the Eastern price was equivalent to £790½ per ton c.i.f. Europe.

FIRM LEAD-ZINC MARKETS

Both the lead and zinc markets have held very steady and the improvement in outside demand reflects in part, at any rate, the prospect not only of the stoppage of the Bunker Hill mine in Idaho being prolonged but also the threat of a strike in the nearby lead and zinc properties of the American Smelting and Refining Co. Lead producers in the U.S. report sales last week at 17,000 tons mainly on a fixed price basis of 12 c. rather than on an average of month of delivery price which affords some protection in the event of a rise in the quotation. Zinc demand, on the other hand, remains quiet. In London, further substantial sales of zinc for early arrival, generally believed to concern metal of Gulf origin, resulted in the establishment of a temporary contango for the mid-month settlement. In the case of lead, however, a widening in the backwardation took place, mainly on technical considerations and in view of the fact that arrivals of foreign metal are being well absorbed by the current good level of consumption.

Closing prices are as follows:

	May 12		May 19	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£249	£249½	£250	£250½
Three months ..	£243½	£244	£246½	£246½
Settlement ..	£249½		£250½	
Week's turnover	9,425 tons		13,525 tons	
LEAD				
Current ½ month	£77½	£77½	£77½	£78
Three months ..	£76½	£76½	£77	£77½
Week's turnover	10,250 tons		15,025 tons	
TIN				
Cash ..	£786½	£787	£785	£785½
Three months ..	£785½	£786	£785	£785½
Settlement ..	£787		£785½	
Week's turnover	580 tons		645 tons	
ZINC				
Current ½ month	£91½	£92	£92½	£92½
Three months ..	£91½	£91½	£92½	£92½
Week's turnover	7,850 tons		5,875 tons	

London Metal and Ore Prices appear on page 592.

Sir Ewen Fergusson on Tin

The increasing prosperity of the tin producers continues to make its mark on the share market with a stream of higher dividends. And the outlook for the metal price, now £785 a ton or exactly the same as its 1959 average, remains stable enough. There had been fears in some quarters that the recent decision of the International Tin Council to withdraw the Buffer Stock manager's freedom to operate between the price ranges of £780 and £830 would cause the metal price to pass above the £800 mark and so arouse antagonism in the United States. That country is not a party to the International Tin Agreement but has been content to view it benevolently. Whether such benevolence would continue if the price started to boom is another matter. And America has a stick with which to beat the I.T.A. in the shape of its strategic stockpile of tin.

It looks, however, as though there is little danger of the tin price running away unless, that is, world tension becomes so taut as a result of this week's events in Paris that panic buying starts. At the recent annual meeting in Singapore of that big tin-smelting concern the Straits Trading company, the chairman, Sir Ewen Fergusson, dwelt on the uncommitted stocks of metal that can be drawn upon to feed the world market if necessary. At the end of 1959 such stocks amounted to about 20,000 tons at minehead and 10,000 tons in the Buffer Stock. This total of 30,000 tons is, Sir Ewen thinks, a "formidable" figure. Consumers should have no worries about shortages developing.

These stocks must be viewed in relation to an annual production by the I.T.A. signatories which Sir Ewen thinks is likely in practice to be in the neighbourhood of 145,000 tons per annum split up as to Malaya 58,000 tons, Indonesia 27,000 tons, Bolivia 25,000 tons, the Belgian Congo 14,000 tons, Siam 12,000 tons and Nigeria 9,000 tons. This compares with an estimated world consumption of between 150,000 and 155,000 tons excluding Russia and China. So "considerable reliance must be placed on the production of non-signatory countries, and possibly on some exports from the two Communist countries, if the world's needs are to be met".

AMPAT AND SIAMESE

Altogether, there seems little reason to doubt that the big tin producers will continue to enjoy a high rate of production at a very satisfactory price. It is the increased output compared with last year's restricted tonnages under the I.T.A. that is drawing in the sharply advanced profits. But last year's expanding quotas were already spelling higher earnings. Thus Ampat, the Malayan producer, has just announced a net profit for 1959 which at £84,964 is £36,245 higher than in 1958. It comfortably covers an increase in the dividend on the 4s. shares from 30 per cent to 45 per cent and allows £25,000 to be put to contingencies reserve at the expense of a drop of barely £9,000 in the carry-forward to £96,169.

Ampat's permissible export quotas in

1959 totalled 663 tons of tin concentrates. Those for the first half of 1960 are as much as 502 tons. Here is a clear indication that the company's earnings in the current year should show a further substantial advance. Present price of the shares is 16s. cum the final dividend of 1s. 2.4d. gross. The yield after allowing for this is 11.8 per cent on the 1959 payment.

Another Far Eastern company which did considerably better in 1959 is Siamese Tin Syndicate. The consolidated net profit has recovered sharply from £23,500 to £135,628. But it is not proposed to add to the 5 per cent interim for the period on the 5s. units. The 1958 distribution was also 5 per cent. Instead the carry-forward is doubled at £262,475 and an interim of 20 per cent declared on account of 1960. The reason for this must await next month's annual report.

WESTERN SELECTION QUARTERLIES

It is sometimes forgotten that the South African gold mines are not the only ones that keep their shareholders up to date with monthly profit statements and quarterly development results. The same plethora of information comes from the gold mines of Ghana. The March quarterly reports of the mines in the Western Selection and Development group have appeared this week. The working profits before allowing for tax and development redemption are shown below together with those for the two preceding quarters.

	Mar. qtr.	Dec. qtr.	Sept. qtr.
Amalgamated	£	£	£
Banket	52,931	90,530	122,502
Ariston	151,711	153,489	152,842
Bremang	81,180	75,814	127,027
Ghana			
Main Reef	45,278	39,045	36,847

Ariston's development work on the important No. 2 orebody is approaching an interesting stage on the 30th and lowest level, 450 ft. below the 27th level. It is stated that preliminary results on this level should be available during the current quarter.

The falling away in the earnings of Amalgamated Banket strike the eye immediately. They are due to a combination of rising costs and falling grade of ore milled, principally the latter. This large property is, in fact, continuing to suffer from its inability to get development and ore reserves far enough ahead of mining operations to enable the last-named to reach any kind of stability. This is not a criticism of management. It is a headache of management operating a marginal mine, always balancing on a razor edge of trying to earn enough money to finance a catch-up in the development situation.

It is fortunate for Amalgamated Banket stockholders that the chairman, Mr. C. J. Burns, is able in his statement in the annual report now issued to put the present situation in a much less desperate light owing to the £450,000 interest-free loan granted to the company by the Ghana Government, as announced in January. "This is indeed a generous and far-sighted assistance," Mr. Burns quite rightly says. It will enable A.B.A. to do all it can to overtake its

development position. It will enable the company, although Mr. Burns does not say this, to keep going in the hope that one of these days a rise in the gold price will bring its large amounts of marginal ore back into the sphere of practical mining economics.

If all goes well and A.B.A. is able to contemplate dividends once again (the last payment was 10 per cent on the 3s. units for 1954-55) it will not be precluded from making payments by the loan terms. The loan is only repayable when the company becomes profitable and pays a dividend of 3 per cent or more in any one year. A.B.A. stand at 1s. They are a long-term gamble.

OPTIMISM FOR DE BEERS

The full report of De Beers Consolidated Mines is remarkable for two things, the continuing financial strength of this huge branch of the Anglo American empire, dented only slightly by the South African political troubles since the turn of the financial year, and the mostly roseate hue surrounding Mr. Harry Oppenheimer's annual review of the group's affairs. There are, admittedly, one or two bear points. Without the exceptional influence of American stockpiling the supply of industrial stones in 1959 would have been "considerably in excess" of demand. "Increasingly severe competition" must be expected from the synthetic industrial material manufactured by the General Electric company.

On the other hand, demand for gem stones in 1959 was in excess of production, enabling stocks to be run down. The shortage, Mr. Oppenheimer says, is likely to persist so far as the larger good quality diamonds are concerned. The new marketing arrangement with Russia is working smoothly. Williamson Diamonds in Tanganyika has yielded its first income to De Beers with a £500,000 dividend on its 50 per cent stake therein. It looks as though Williamson should pay more this year.

All in all, Mr. Oppenheimer feels that he is "justified in saying that the trading prospects for our company in 1960 appear favourable."

As usual, the consolidated profit figures in the annual report are new, the preliminary announcement with the dividend having only covered the earnings of De Beers itself. The net profit in 1959 attributed to De Beers was £21,402,943 against £17,739,048 in the previous year. After deducting Preference dividends, £20,600,000 is left for appropriation. Of this the increased Deferred dividend of 12s. 6d. per 5s. share takes only £10,600,000. Transfers to reserves total £12,200,000 and a similar amount is carried forward.

The balance sheet is as impressive as ever. At December 31 the value of the non-diamond holdings and net cash assets came to £108,717,099. By April 4 this figure had been denuded by £10,331,000 owing to the fall in quoted investments caused by South Africa's racial upheavals. And there will have been some further decline since. The group's stake outside diamonds, in the African explosive and chemical industries and in South African golds, nevertheless still represents a significant part of the overall asset value.

At 141s. 3d. De Beers Deferred give the generous yield of 8.8 per cent before allowing for double tax relief. The dividend looks safe enough. Here, in fact is a sound recovery stock should there be any real improvement in the South African political outlook. The price touched 200s. earlier this year before the troubles there started.

LONDON MARKET HIGHLIGHTS

After recovering at the end of the previous week, the South African Gold share market settled down to a very humdrum existence last week. Business ebbed away to a mere trickle and share prices were inclined to droop. The Cape seemed little inclined to operate but occasional buying orders from that centre were sufficient to cheer the share prices concerned. Despite its present lethargic state, the Kaffir market here is still none too well supplied with stock, and prices can thus respond quickly to any revival of demand.

Free State Geduld and Western Holdings fluctuated indecisively last week at around 122s. 6d. while Stilfontein at 32s. 6d. were unaffected by the annual report and its details of 1960 capital expenditure plans. Vaal Reefs, however, after rising to 43s. 9d. reacted to 42s. 6d. following the chairman's mention of new shafts being needed in the next few years. Similarly, the below-average gold values at depth in East Rand

Proprietary caused the shares to wilt 1s. 3d. to 29s. 4½d.

Finance House issues tended to droop when no Cape support was forthcoming. Gold Fields, for instance, slipped back 1s. 6d. to 61s., but Johannesburg inquiry raised Rand Mines 2s. 6d. to 71s. 3d. In the Diamond group "Casts" (22s. 9d.) were little affected by the unchanged interim. The encouraging report and chairman's statement of De Beers left these shares virtually unmoved at around 141s. 3d.

Coppers followed a similar pattern to that set by Kaffirs, but steadied following the improvement in the metal price. Bancroft at one time responded to some rather vague rumours that a dividend declaration was pending. But after jumping to 20s. 6d. the price quickly fell back again to 19s. 7½d. Messina improved to 105s. in front of the coming four-for-one scrip issue but Charter showed little recovery at 78s. 9d.

The Tin share market bubbled along

quite happily. A certain amount of profit-taking was seen but this was well balanced by fresh buying. After a new rise of 1s. 6d. to a high of 26s. 6d., Sungei Besi reacted to 26s. following some profit-taking.

Particularly good results coupled with the now usual sharp dividend increases were announced by Ampat and Siamese. The former jumped 1s. 9d. to 16s. 1½d. before easing back slightly to 15s. 10½d. while the latter touched 14s. 6d. bid and then reacted to 14s. 1½d. A speculative demand raised Kay Tin from 3d. to 7½d. and Fabulosa were marked up 6d. to 4s. Among other Tin issues, Jantar improved to 4s. 10½d. on the re-calculated columbite ore reserve figure while Beral advanced 2s. 3d. to 30s. 9d. in response to figures showing that Portuguese wolfram exports were doubled last year.

The Lead-Zinc section again produced no outstanding movements but the tone was helped by the recent firmness of lead, the price of which reached its highest since November 1947. Elsewhere, the earlier abrupt cessation of U.S. buying resulted in a further easing to 116s. 3d. in St. John d'el Rey

DE BEERS CONSOLIDATED MINES LIMITED

(Incorporated in the Union of South Africa)

DEMAND FOR DIAMONDS CONTINUES FIRM

RESEARCH LABORATORY'S ACHIEVEMENTS

The following are extracts from the statement by the Chairman, **Mr. H. F. Oppenheimer**, which has been circulated with the report and accounts for 1959.

Sales of diamonds by the Central Selling Organization in 1959 amounted to £91,135,943 and were easily a record. The previous highest figure was £76,772,112 in 1957.

The demand for both gem and industrial diamonds was strong throughout the year and has continued firm during the first quarter of this year. However the market for industrial diamonds has been powerfully influenced by stockpiling by the United States Government and, without this exceptional factor, the supply of industrial goods would have been considerably in excess of the demand. Moreover, in the abrasive field, increasingly severe competition must be expected from the synthetic product.

Current consumption of gem diamonds, on the other hand, was in excess of production and the Group reduced its stocks substantially during the year. While the supply of smaller and lower quality stones is adequate, there is a shortage which is likely to persist of the larger good quality diamonds. Our subsidiary, the Consolidated Diamond Mines of South-West Africa, is by far the most important source of such diamonds and its long term prospects are, therefore, particularly good. Taking all these factors into account, I think I am justified in saying that the trading prospects for our company in 1960 appear favourable.

Sierra Leone

During 1959 there were two important developments which should conduce to the stability of the industry. In the first place, an arrangement was made with the Government of Sierra Leone by which

a Government diamond office was set up through which all diamonds produced by individual alluvial diggers must be marketed. The Diamond Corporation has undertaken to offer to purchase all diamonds passing through this office at prices agreed with the Government and the diggers have the option either to accept this offer or send their diamonds to London for sale by tender by our Central Selling Organization. In practice the Diamond Corporation's prices have, in most cases, been accepted by the diggers and our purchases of these goods are on a much higher scale than in the past with a corresponding reduction in the illicit trade.

In the second place, towards the end of 1959, an agreement was made between the Diamond Corporation and Soviet authorities, whereby all diamonds produced in Russia which the Soviet authorities wish to export outside the Soviet bloc are being marketed by the corporation. This arrangement is working smoothly and, we believe, to the satisfaction of both parties.

The year 1959 was the first full year of operation of the Williamson mine under the joint control of the Government of Tanganyika and our Company. Results were very satisfactory and the Williamson Company was able to declare a dividend of £1,000,000 after meeting substantial capital expenditure and putting £1,000,000 to general reserve.

A remarkable technical achievement was the discovery by our Adamant research laboratory in Johannesburg of a method of making synthetic industrial diamonds of the same type as those manufactured by the General Electric Company. The grit originally manufactured was suitable only for use in resinoid bonded grinding wheels, but we are

now able to produce a synthetic grit suitable for metal bonded wheels.

Our research laboratories have also done valuable work in producing improved types of natural diamond grit. Recently special natural grit for use in metal bonded wheels has been developed.

Our research work is, therefore, well ahead in both the synthetic and the natural fields, but it is too early to say whether we will finally decide to manufacture synthetic grit on a commercial scale. In all these matters we shall continue to work in close co-operation with the Societe Miniere du Beceka, the Belgian Congo diamond mining company which produces most of the material from which the natural grits are prepared.

I have no doubt that there is a permanent place in the world's markets for both the natural and the synthetic products, and the ultimate prosperity of both branches of the industry depends on finding new and extended uses for diamond grit of both types. The opportunities for such expansion appear to be considerable.

Financial Results

The financial results for the year were satisfactory. The consolidated net profit, after deduction of the minority interests, was £21,402,943, which compares with £17,739,048 in 1958. The deferred dividends for the year were raised by 2s. 6d. to a total of 12s. 6d. per share.

At December 31 the value of the Group's investments outside the diamond industry, taking market prices for quoted investments and book value for unquoted, was £81,344,390 and the Group's net current assets amounted to £43,781,098.

Unfortunately, since the end of the year, there has been a reduction in the market value of our quoted investments, which at December 31 stood at £55,220,977, of £10,331,000 or 18.7 per cent. based on stock exchange quotations on April 4. This depreciation is largely the result of political uncertainties in Africa and, in particular, concern about disturbances in the Union.

WEST RAND CONSOLIDATED MINES, LIMITED

(Incorporated in the Union of South Africa)

REVIEW OF OPERATIONS DURING THE YEAR ENDED DECEMBER 31, 1959

Chairman's Statement

The following is a statement dated March 28, 1960, made to members by the Chairman, **Sir George W. Albu, Bart.**, on the Directors' Report and Accounts for the year ended December 31, 1959:—

The total profit from operations during the year 1959 amounted to £2,666,873 representing a decrease of £133,959 as compared with the results for the previous year. This decrease is mainly attributable to a rise in working costs in both the gold and uranium sections of the mine, a decrease in Head Office revenue, and the contribution to the research programme inaugurated by the Atomic Energy Board, to which I shall refer later, offset, however, by an improvement in revenue obtained in the gold section as the result of a larger tonnage milled. The dividend distributions of the previous year were maintained and the deficit for the year of £23,176 reduced the balance of unappropriated profits carried forward to £1,119,874.

The development footage accomplished at 107,515 feet was 5,947 feet in excess of the previous year, of which an additional 3,553 feet was effected in the gold and 2,394 feet in the uranium

sections. Of the footage sampled in the gold section 15,340 feet or 64.6 per cent. was payable with an average value of 294 inch dwt., both these results showing a decrease as compared with the two previous years. In the uranium section 22,215 feet or 80 per cent. was payable with average values of 2.2 dwt. gold and 50.4 ounces uranium respectively over a reef channel width of 22.9 inches, these results indicating a slight improvement on those obtained over the previous year.

The ore reserves in the gold section amounting to 4,759,000 tons over a stoping width of 49 inches with a value of 3.4 dwt., represented a reduction of 219,000 tons with no change in the width or value. In the uranium section the ore reserve totalled 3,547,000 tons over 34 inches with values of 0.7 dwt. gold and 21.2 ounces uranium per ton. These figures, apart from the slight increase in the tonnage available, show practically no change from the previous year.

Uranium Supplies

The Company's contract for the supply of uranium expires on December 31 1964. Discussions have recently been held between members of the South African

Atomic Energy Board and representatives of the Combined Development Agency, which is the joint purchasing Agency of the Atomic Energy Commission of the United States Government and the Atomic Energy Authority of the United Kingdom. These discussions are part of the pattern of periodic consultations which are held in connection with the sale of South African uranium to the Agency. The present discussions have covered not only matters of importance connected with the existing contracts, but have also reviewed the position which will arise at the end of the present contracts in the middle 1960's. No changes in the present contracts have resulted from these discussions, but both the Board and the Agency have agreed to give further consideration to the position and at a later date the discussions may be resumed.

Permission was granted, late in 1959, to South African uranium producers to publish information relating to uranium output and price received since the commencement of uranium production operations, and the tabulated statement attached to the Report of the Directors now reflects complete information since production of uranium commenced on the mine.

Research and Development Programme

With the object of improving and strengthening South Africa's position in the competitive market for uranium, a Research and Development Programme which is estimated to cost £4,000,000 spread over a period of 5 years has been established. The Transvaal and Orange Free State Chamber of Mines, on behalf of its uranium producing members, has agreed to contribute an annual sum of £400,000 towards the cost of such programme, and it has been agreed that this contribution will be obtained from individual producers on the basis of the number of pounds of uranium sold each year. The first payment of £300,000 in respect of the period April to December, 1959, was made by the Chamber during that year and this Company's proportion amounted to £29,380.

The supply of native labour was on average better than for many years past and there were periods when the supply was in excess of requirements, but towards the end of the year the reverse was the case.

It has been decided to establish a Group Training School on your Company's property for the benefit of the major producing mines of the General Mining and Finance group, and the construction of the necessary buildings which was put in hand since the end of the year under review has already been completed. The cost of the permanent buildings estimated at £12,000 will be borne by, and the buildings will remain the property of, your Company.

The erection of the plant for the extraction of electrolytic manganese from the uranium plant residue, referred to in my review of operations last year, was completed early this year and normal production is expected to be reached by the middle of 1960.

Apart from the temporary curtailment of the electric power supply in consequence of the closing of the Coalbrook Colliery, which affected the mine's output during the month of March, 1960, operations for the current year have progressed normally.

LONDON METAL AND ORE PRICES, MAY 19, 1960

METAL PRICES

Aluminium, 99.5%, £186 per ton	Manganese Metal (96%/98%) £275/£285
Antimony—	Magnesium, 2s. 2½d./2s. 3d. lb.
English (99%) delivered, 10 cwt. and over £190 per ton	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £22/£24 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 6d. lb.	Palladium, imported, £8 12s. 6d.
Cerium (99%) net, £16 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £30 5s.
Chromium, Cr, 99% 6s. 11d./7s. 4d. lb.	Imported £284/284
Cobalt, 12s. lb.	Quicksilver, £701/£71 ex-warehouse
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Rhodium, £45/£48 oz.
Gold, 250s. 11d.	Ruthenium, £16/£18 oz. nom.
Iridium, £23-£25 oz. nom.	Selenium, 50s. 0d. per lb.
Lanthanum (98%/99%) 15s. per gram.	Silver, 79½d. f. oz. spot and 79½d. f.d.
	Tellurium, 21s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	19s. 6d./21s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	230s./235s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
Chromite Ore—	20% 3s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifabable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
Hard Lumpy 45%	£15 10s. 0d. per ton c.i.f.
Refractory 40%	£11 0s. 0d. per ton c.i.f.
Smalls 44%	£13 5s. 0d. per ton c.i.f.
Baluchistan 48%	£11 15s. 0d. per ton c.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	Nb ₂ O ₅ : Ta ₂ O ₅ 175s./180s. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 67s. 6d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£28 0s. 0d. per ton c.i.f. Aust'n.
Ilmenite 50/52% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	147s. 0d./152s. per unit c.i.f.
Vanadium—	
Fused oxide 95% V ₂ O ₅	8s./8s. 11d. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65-66% ZrO ₂	£16/£16 10s. ton c.i.f.

The proposed abolition of the Savings Levy, as referred to by the Minister of Finance in his recent Budget Speech, will have little or no effect upon your Company.

This concludes my review of the Company's operations for the year 1959 and I wish to express the Board's appreciation of the loyal and efficient services rendered by Mr. E. M. Stewart, the Mine Manager, and his staff at the mine, as well as by the technical and secretarial staffs at Head Office.

At the Annual General Meeting of members of the Company held in Johannesburg on May 10, 1960, the Chairman of the Company stated:—

"My review of operations at the mine during 1959 was included with the Report of the Directors and audited Accounts submitted to you to-day for your approval and adoption. I have no further information to add to that already given you, and I now move that the Directors' Report and audited Accounts for the year ended December 31, 1959, be and they are hereby approved and adopted, and that all matters and things undertaken and discharged by the Directors on behalf of the Company be and they are hereby confirmed."

Coming Events

The N.C.B. in conjunction with the Coal Utilization Council, is exhibiting at the Industrial Exhibition, Hanley Park, Stoke-on-Trent, on May 18—June 4.

The Institution of Mining Engineers announces the following meetings: Summer Meeting, 1960, Cardiff, June 29, 30, and July 1. Latest date for return of final reply form is May 25. Also 119th General Meeting, Cardiff, June 29, 1960.

The Summer Meeting of the Manchester Geological and Mining Society will be held on June 9.

The Midland Counties Institution of Engineers announces that on May 18 at Ashby-de-la-Zouch, S. A. McKee will present the paper, "The Application of the Monoveyor at Donisthorpe colliery. The Summer Meeting of the Institution will be held on June 15.

The 82nd Annual General Meeting of The Mining Institute of Scotland will be held in Glasgow on May 28, 1960.

A paper dealing with further studies on the ploughability of coal seams (with particular references) will be presented by Prof. E. L. J. Potts and F. F. Roxborough to The North of England Institute of Mining and Mechanical Engineers at Newcastle-on-Tyne on June 9, 1960.

The 122nd Annual Meeting of the British Association for the Advancement of Science will be held in Cardiff from August 31 to September 7, 1960, under the Presidency of Sir George Thomson, F.R.S., Master of Corpus Christi College, Cambridge. The title of his Presidential address will be "The Two Aspects of Science".

WESTERN SELECTION AND DEVELOPMENT GROUP

Registered Offices: 120 Moorgate, E.C.2

Extracts from Mining Companies' Progress Reports for Quarter ended 31st March, 1960

ARISTON GOLD MINES (1929) LTD.

Authorised Capital £1,500,000
Issued Capital £1,285,714
in 10,285,714 Units of Stock of 2/6 each.

OUTPUT AND PROFIT
Tons Milled 121,080
Gold Produced—fine ozs. 39,317
Recovery per ton—dwts. 6.94

Per Ton Milled
Working Revenue £ 488,523 s. d. 80 8
Working Expenditure £ 336,812 s. d. 55 8
(a) Working Profit £ 151,711 s. d. 25 0

CAPITAL EXPENDITURE
Capital Expenditure during the Quarter amounted to £27,778.

DEVELOPMENT
A total of 6,077 feet of development was advanced during the Quarter, the total expenditure being £45,184.

NORTH OREBODY
Value Width
Dwts. Inches
26th Level
No. 242 North Crosscut 16.9 24
Two pay zones totalling 959 feet have been exposed on this level averaging 5.6 dwts. over 79 inches width.

Value Width
Dwts. Inches
29th Level
No. 249 North Crosscut 7.7 55

NO. 2 OREBODY
Value Width
Dwts. Inches
11th Level
No. 244 South Crosscut 6.2 16
No. 245 South Crosscut 12.1 64
This exposure overlies the pay zone on the 12th Level which averaged 9.5 dwts. over 50 inches for a distance of 294 feet. Driving to the south on the 11th Level is continuing.

Value Width
Dwts. Inches
26th Level
No. 203 North Crosscut 5.1 50
27th Level
No. 210 South Crosscut 6.8 50
No. 211 South Crosscut 2.7 88
No. 212 South Crosscut 6.7 102
No. 213 South Crosscut 6.9 303
The exposure in No. 213 South Crosscut conforms as to width with the corresponding crosscut on the 26th Level.

30th Level—The drive south on the 30th Level from the No. 2 winze is continuing and is now approaching an important phase in the programme to explore the No. 2 Orebody on this level at 450 feet below the 27th Level. Preliminary results should be available during the current quarter.

WEST REEF
Value Width
Dwts. Inches
23rd Level
No. 251 North Crosscut 10.8 40
This Crosscut underlies a pay zone on the 22nd Level, which averaged 10.2 dwts. over 34 inches for a distance of 250 feet.

SOUTH OREBODY
Stope driving on the 5th Level between Nos. 277 South and 279 South Crosscuts has indicated foot-wall and hanging wall orebodies of over average ore reserves value. It is not yet possible to assess the extent of the two exposures as the reef is not fully exposed, and stope driving is continuing.

SHAFT SINKING
Ankobra Shaft—North of North Shaft—Sinking of the Ankobra Shaft was started during the quarter. At the end of the quarter the Shaft was 59 feet below the surface collar—No. 1 level is to be driven at 125 feet below the collar.
No. 4 Winze—The collar of this Winze has been put in at the 25th Level, and the Winze is now 77 feet below that point.

BREMANG GOLD DREDGING CO., LTD.

Authorised Capital £1,250,000
Issued Capital £521,685
in 5,216,848 Units of Stock of 2s. each

OUTPUT AND PROFIT
Cubic Yards Dredged 2,663,800
Gold Produced—fine ozs. 15,465
Recovery per Cubic Yard—
Bullion—Grains 3.01

BREMANG GOLD—Continued

Per Cubic Yard Dredged
Operating Revenue £ 192,891 s. d. 17 38
Operating Expenditure £ 111,711 s. d. 10 06
Operating Profit £ 81,180 s. d. 7 32

Capital Expenditure during the Quarter amounted to £7,343.

The four Dredges and Ancillary Plant worked satisfactorily throughout the period.

AMALGAMATED BANKET AREAS LTD.

Authorised Capital £3,300,000
Issued Capital £2,884,900
in 19,232,669 Units of Stock of 3/- each.

OUTPUT AND PROFIT
Tons Milled 181,967
Gold Produced—fine ozs. 39,285
Recovery per ton—dwts. 4.318

Per Ton Milled
Working Revenue £ 489,414 s. d. 53 10
Working Expenditure £ 436,483 s. d. 48 0
(a) Working Profit £ 52,931 s. d. 5 10

CAPITAL EXPENDITURE
Capital Expenditure during the Quarter amounted to £17,209.

DEVELOPMENT
A total of 8,556 feet of development was advanced during the Quarter, the total expenditure being £62,565.

AKOON SECTION
3,615 feet were sampled of which 2,230 feet (61.7%) proved payable at 6.7 dwts. over 38.9 inches.

MANTRAIR
1,155 feet were sampled of which 175 feet (15.2%) proved payable at 5.8 dwts. over 36.5 inches. Development here was mainly exploratory driving below the Effuenta pay shoot.

FANTI SOUTH SHAFT
1,150 feet were sampled of which 435 feet (37.8%) proved payable at 5.0 dwts. over 36.2 inches.

TAMSOO SECTION
850 feet were sampled of which 405 feet (47.6%) proved payable at 5.2 dwts. over 36.0 inches.

EFFUENTA SECTION
600 feet were sampled of which 135 feet (22.5%) proved payable at 4.6 dwts. over 36 inches. Development here consisted mainly of prospecting beyond the Ore Reserves Block limits and has now reached a conclusion.

GHANA MAIN REEF LTD.

Authorised Capital £1,500,000
Issued Capital £1,114,363
in 4,457,450 Units of Stock of 5/- each

OUTPUT AND PROFIT
Tons Milled 36,764
Gold Produced—fine ozs. 12,563
Recovery per ton—dwts. 6.834

Per Ton Milled
Working Revenue £ 156,245 s. d. 85 0
Working Expenditure £ 110,967 s. d. 60 4
(a) Working Profit £ 45,278 s. d. 24 8

CAPITAL EXPENDITURE
Capital Expenditure during the Quarter amounted to £23,393.

DEVELOPMENT
A total of 2,595 feet of development was advanced during the Quarter, the total expenditure being £17,543.

MAIN SHAFT SECTION
No. 18 Level
1814 Fissure Drive, North gave 145 feet at 9.7 dwts. over 53.3 inches.

The Main Shaft was sunk a further 74 feet to a total depth of 3,119 feet below the Collar on Surface.

EKOTOKROO SECTION
No. 7 Level
716 Fissure Drive, South gave 25 feet at 9.39 dwts. over 41.2 inches.

TUAPPIM SHAFT SECTION
No. 17 Level
1700 Stope Drive, South gave 135 feet at 8.7 dwts. over 59.4 inches.

No. 18 Level
1800 Fissure Drive, South, Ex. No. 1 Crosscut gave 225 feet at 6.86 dwts. over 70.1 inches.

No. 19 Level
1900 Stope Drives North and South.
The total payable length to date of these Drives is 320 feet averaging 13.5 dwts. over 46.8 inches.

(a) Excluding Development Redemption

THE STRAITS TRADING COMPANY LIMITED

At the Annual General Meeting of The Straits Trading Company, Limited, held in Singapore on May 6, 1960, the Chairman, **Sir Ewen Fergusson**, who presided, said:

The Reports and Accounts for the year ended December 31, 1959, having been in your hands for the prescribed time, I shall with your permission take them as read.

Compared with the previous year there was little difference in the quantity of concentrates which reached the smelters and, with our capacity only partially utilized, from the point of view of smelting activity it was another poor year.

Substantial downward changes in mines output are as disconcerting to the smelters as they are to the producers and we hope that the experiences of the last two years are not likely to be repeated. We also hope that the reasonable equilibrium which has now been achieved between supply and demand will be maintained, and that only minor corrective changes will be required from quarter to quarter in the permitted exports of the producing countries signatory to the Tin Agreement.

The outlook for the current year is much better, and we look forward to supplies of concentrates once more approaching the volume of 1957. There is ample tin smelting capacity in Malaya, well capable of efficiently dealing with considerably more concentrates than are likely to be available. Reserve capacity has always been maintained and it is prudent that this should be so.

It is of the utmost importance for it to be appreciated that the volume of concentrates which the smelters are able to purchase has considerable bearing on the terms which can be offered to producers. Thus it is in the general interest to make these terms attractive, and for us in consequence to be able to attract supplies of concentrates from as many countries as possible.

In looking over some old records I was interested to see what the basic terms were in 1922. I find that it is only since the recent heavy increase in oil prices that our terms have for the first time very slightly exceeded those of 38 years ago. I can think of no other service cost which has altered so little in its incidence over these years.

Plant and equipment, salaries and wages, fuel, electric power, anthracite, transport and stores of every description, as anyone knows, have increased many times over. The simple answer to the obvious query is that technical progress in tin smelting has been considerable and has been passed over in full measure to our mining constituents.

It was therefore most discouraging when in November last year the Federation Government saw fit to place a heavy tax burden on primary energy. Overnight the price of heavy fuel oil, of which we use some hundreds of tons per month, was increased by 65%, and electric power became dearer by 10%. Some idea of the magnitude of the increase in the oil price may be judged from the fact that the tax itself is 1½ times the price we paid for fuel oil before the last war.

We feel that the advice given to the Federation Government, which persuaded it to introduce such a fiscal measure was not far-seeing, and in continuing what has now become a burden of arbitrary and selective incidence, we

suggest that it can only be detrimental to the industrial development policy which the Government is so rightly anxious to foster.

I am tempted to refrain from mention of the International Tin Control Scheme, but an important stage has now been reached with the approaching United Nations Conference in New York, the purpose of which is to consider the draft of a new Agreement to take the place of the present one when it expires on June 30, 1961. Let us hope that with the experience which has been gained from the operation of the present one, any other which is drawn up will be capable of being operated as originally intended, not face any serious difficulties nor require too many *ad hoc* interpretations and changes from time to time throughout its life.

I am a firm believer in the price mechanism. It was never the purpose of the first Agreement that it should be dispensed with, and I hope it will not be the purpose of any subsequent one to do so. If rigidity of price were to be an aim, then it is my opinion that quite different methods of international trading would have to be developed. I feel sure they could not operate with the efficiency and speed of the present system of world marketing. If scheme there has to be, it should be an adjunct to the price mechanism, not a substitute for it.

It may be of interest to record that the tin production from the signatory countries was:—

161,000 tons in 1930
203,000 " " 1940
152,000 " " 1950
155,000 " " 1956
152,000 " " 1957

During the two years immediately preceding restriction the production of the various countries had a considerable bearing on the percentages and the votes they would enjoy when the Tin Agreement came into actual operation. There may well have been some scraping of the barrel in consequence. I doubt if any of these output figures will be attained in future, and it may not be far out to suggest the following as estimations of future outputs:—

Malaya	...	58,000 tons
Siam	...	12,000 "
Indonesia	...	27,000 "
		97,000 tons=67%
Congo	...	14,000 "
Nigeria	...	9,000 "
Bolivia	...	25,000 "
		48,000 tons=33%
		145,000 tons

There may, of course, be dormant capacity of which we know nothing, or large undeveloped areas only awaiting the inflow of new capital equipment to exploit them, but the picture is still one of slowly growing demand and, from the above figures, of diminishing supplies.

It may be noted in passing that the current quarter's quota of 37,500 tons means an annual rate of 150,000 tons, though it is at that high rate because of production difficulties in some of the countries, and of the Tin Council's desire to ensure adequate supplies to market.

World consumption might be put at between 150,000 and 155,000 tons, excluding Russia and China, so consider-

able reliance must be placed on the production of non-signatory countries, and possibly on some exports from the two communist countries, if the world's needs are to be met.

There are, however, ample uncommitted stocks, that is stocks which have not been sold to the market, and which are financed by the producers of the signatory countries. Consumers should have no worries about shortages developing when it is estimated that these stocks at December 31, 1959, amounted to about 20,000 tons at minehead and 10,000 tons in the Buffer Stock. 30,000 tons in reserve is a formidable figure of unsold stock, which could well prove to be a menace to the market in certain circumstances. It is certainly no mean hostage to any consumer fears of runaway prices, even though there is likely to be a decline in the stocks during the current year.

By far the largest use of tin is in tinplate for the canning industry, in which its functions may be described as one of the thinnest and most useful protective paints in the world. No other coating has so far been found which will give all the glittering qualities of Tin. The danger is not so much that a substitute will be found for it as a coating, as that a substitute may be found for steel strip as a container, or that rising prices of sheet steel will make it non-competitive with other metals which might not need tin as a coating.

So far the tendency is for more tinplate to be required to meet the growing demand, and it is just as well not to forget the contribution towards keeping down costs and conserving tin that has come from high speed electro-deposition of tin during tinplate manufacture. A little tin now goes a very long way, and it will be a sad day if steel strip ever gets priced out of its container market.

World industrial activity was at a high level in 1959 and while there are some uncertainties about the outlook for 1960 there is no feeling that any disastrous set-back is on the way. I feel that Malaya and the other tin producing countries in South East Asia may well be fully extended to produce the world's tin requirements. It is evident, however, from the figures I have given earlier that South East Asia alone cannot supply these needs and thus the market price cannot be divorced from the requirements of the marginal producers both in this part of the world and elsewhere.

The imponderables remain Russia and China. Will they be heavy exporters on balance after they have satisfied their own growing needs? It is the answer to that question which is likely to determine the future course of the tin market and there is no reliable information of which I am aware.

I now turn to the Accounts.

The increase in our earnings is due to better distributions from our investments including Pelam Estate, and in consequence it is with pleasure that we are able to recommend final payments for the year which slightly more than restore the total distribution to what it was for the year 1957.

There are no points which call for special mention on the Liabilities side of the Balance Sheet. On the Assets side, Works, Land, Building and Furniture have been subject to normal depreciation, but it is obvious that the item is very conservatively valued and would take considerably more to replace than the figure at which it appears in the Accounts.

Investment in Subsidiary Companies remains unchanged and reduction in the amounts due reflects repayments during the year. The aggregate value of Sundry Investments is well below the market value, the largest portion of them being in tin producing companies.

Tin and Tin Ore in Stock and in Transit is higher because of the increased quantities coming forward as restriction measures were eased at the end of the year. After making due allowance for smelting, treatment and contingencies it is safely valued. Other items call for no comment.

We expect some improvement in the small operations in Tanganyika but not from those at Litherland, so far as can be judged at the present time.

The joint venture with Renong Tin Dredging at Jinjang continued to be successful, though the property, with its heavy clay, is no easy one to work. The results bear testimony to highly efficient technical management.

Pelam Estate benefited from the higher rubber price and progress continues with clearing and planting the small remaining area of land which we have available. It is a great disappointment that

the Kedah Government decided not to alienate the further area which we had confidently expected, but we still hope there will be a change of heart, which will enable us to operate the size of estate we have been planning for over ten years.

We take pride in being one of the oldest companies in Malaya. We have had no doubts about the future, and we are delighted that our confidence in the sound common sense of the people is reflected in the stable and confident Governments which are in control in both territories where we operate. That by far our major interests are in the Federation is not surprising when we are so bound up with the prosperity of the tin and rubber industries in both of which we have so large a stake.

As is customary, it gives me great pleasure to mention our Staff and the loyal and efficient service they have given during the year, and I am sure stockholders will wish to be associated with this tribute.

The Report and Accounts were adopted and Mr. Tan Chin Tuan, C.B.E., was re-elected a Director of the Company.

ORANGE FREE STATE INVESTMENT TRUST LIMITED

(Incorporated in the Union of South Africa)

PERIOD OF EXCEPTIONAL MINING PROGRESS

MR. H. F. OPPENHEIMER'S REVIEW

The following are extracts from the review by **Mr. H. F. Oppenheimer**, the chairman, which has been circulated with the annual report and accounts:—

The value of the South African gold output has increased since 1954 by about 50 per cent. to attain the present level of £250 million a year, and the importance of the role played by the Orange Free State mines in this growth can be measured by the fact that their production has increased by 400 per cent. during the same period.

The gold mining industry has contributed substantially to the improvement in the country's overall balance of payments at a time when other exports were affected by adverse world conditions.

A Significant Contribution

Of a total receipt on foreign account of £677 million in 1959 the Orange Free State mines have made a significant contribution of £81 million from sales of gold and uranium which represents no less than 12 per cent. of the total. Indeed, the value of the Orange Free State gold and uranium output now exceeds the individual amounts of the exports of wool, hides and skins, fruit, metal and machinery, and other major commodity groups.

As a measure of the exceptional progress made at the mines of the Orange Free State, the increase in gold output by 1,252,372 to 5,581,783 ounces represents more than half of the improvement achieved by the whole industry during 1959; the tonnage milled increased by 21.8 per cent. to 12,837,000 tons and the average yield improved from 8.225 to 8.696 dwt. per ton. There was only a comparatively small increase of 353,347 lb. in uranium production, owing to the quota restrictions.

The total working profit from gold and uranium of the 10 producing mines of the Orange Free State rose to £38.9 mil-

lion. A continued improvement in revenue and profit can be expected as the present shaft sinking programme is completed and as plans for further development and expansion of the mines are put into operation. Free State Saaiplaas is expected to come into production during 1960 and hoisting or ventilation shafts are being sunk at Free State Geduld, Loraine, President Brand, President Steyn, and St. Helena, whilst at Welkom No. 2 Shaft is being deepened.

Profits and Dividends

The company's profit for 1959 amounted to £2,655,173, a reduction of £30,587 compared with 1958, but it would not be correct to make comparisons without making due allowance for the results of certain exceptional transactions related to realization of investments.

Profit on the realization of investments in 1958 amounted to the unusually high figure of £502,385 and included the sale of a large block of shares to American-South African Investment Company. During 1959, however, the company incurred a loss of £234,325 on the disposal of 240,000 of its holding of 250,000 shares in Freddie Consolidated Mines Limited. If, for purposes of comparison, these exceptional figures are excluded, it will be seen that the profit on the company's investment business for 1959 increased by £706,123 over the corresponding figure for 1958.

Higher dividend income accrued from nearly all of the company's dividend paying investments, the aggregate amount received being £2,996,308 compared with £2,382,527 for the previous year. The Orange Free State mining companies which increased their dividends in 1959 were: Free State Geduld from 5s. to 8s., Harmony from 2s. to 2s. 4½d., President Brand from 5s. to 5s. 6d., St. Helena from 2s. 1d. to 3s.

and Western Holdings from 7s. to 8s. 6d. Monies placed on loan at call earned £65,440 in interest making a total income for the year of £3,061,748.

Administration and general expenses at £80,163 were £21,230 higher than in 1958. Owing to the repayment towards the end of 1958 of drawings against the loan facilities of £2,500,000 granted by Anglo American Corporation of South Africa Limited and De Beers Investment Trust Limited, interest paid at £92,087 was £54,126 less than the previous year.

After providing for the loss of £234,325 on the realization of investments and £809 for United Kingdom taxation, the distributable profit amounted to £2,654,364. Dividends totalling 4s 9d. (1958 4s.) per share were paid, absorbing £2,599,059 leaving £55,305 to be added to the unappropriated profit of £284,907 brought forward from 1958.

Strengthened Cash Position

In 1958, I referred to the exercise of the right held by Anglo American Corporation of South Africa, Limited and De Beers Investment Trust Limited to subscribe for 625,000 shares in the company at 80s. per share. The balance sheet at December 31, 1959, reflects the issue of these shares and the consequent strengthening of the company's cash position. After deduction of share issue expenses and premium on the redemption of 5 per cent. registered unsecured notes, the premium of £3 10s. per share on this allotment amounted to £2,185,397 net, increasing the share premium account to £7,979,780.

During the year the company increased its holding of Loraine, West Witwatersrand Areas and Free State Saaiplaas shares and Free State Saaiplaas 6½ per cent. convertible notes. After making allowance for the sale of the Freddie Consolidated shares, the book cost of investments increased during the year by the net amount of £860,311 to £19,974,005. During the same period, owing to the buoyancy of gold shares, the market value of these investments increased from £46,563,844 to £66,013,165 at the end of 1959, an increase of 41.7 per cent. and almost double the market value two years ago.

The company's participation in the loan of £3,594,677 advanced by Anglo American Corporation of South Africa Limited to Loraine Gold Mines Limited is now a fixed amount of £732,785. The loan is interest free until one year after the date on which gold production commences in the No. 3 Shaft section on the Riebeeck portion of the Loraine company's property. Thereafter, interest will become payable at 6½ per cent. per annum.

The company's participation in the interest-free loan to Jeannette Gold Mines Limited remains substantially the same at £134,954 against a maximum commitment of £155,000. A provision of £123,500 has been made against this loan.

The only long term liability now outstanding is the £2,023,184 of 4½ per cent. registered (Swiss) bonds. The bonds are redeemable at par on June 30, 1966, subject to the company's right to redeem in whole or in part at varying rates from December 31, 1960. It is the intention to provide for the redemption of the loan out of profits and it is anticipated that the ability of the company to maintain a satisfactory level of dividend payments will not be affected.

Rand and Orange Free State Returns for April

GOLD OUTPUT AND PROFIT

Company	April 1960				Current Financial Year				Last Financial Year			
	Tons (000)	Yield (oz.)	Profit* (£000)	Year ends	Tons (000)	Yield (oz.)	Profit* (£000)	Total to date	Tons (000)	Yield (oz.)	Profit* (£000)	Year ends
Gold Fields	100	40,510	204.3	J	950	386,322	1915.0	882	366,354	1872.5		
Doornfontein	117	27,675	67.5	J	1,116	263,018	624.5	983	232,821	536.8		
Libanon	68	11,860	4.4	J	696	122,312	52.2	702	122,136	52.5		
Rietfontein	16	4,210	6.0	D	64	16,835	26.9	64	16,866	28.8		
Robinson	45	10,172	5.5	D	184	38,550	114.4	253	53,040	173.5		
Simmer & Jack	76	13,488	15.9	D	310	54,422	150.0	349	65,554	122.3		
Sub Nigel	66	15,225	16.7	J	660	154,445	188.1	659	158,660	242.2		
Venterspos	130	33,586	75.5	J	1,247	316,702	594.0	1,277	318,036	579.7		
Vlakfontein	52	18,440	87.5	D	205	73,123	346.1	200	71,612	337.2		
Vogels	85	18,343	19.0	D	345	73,940	83.6	372	84,007	163.5		
West Drie	130	120,097	1067.7	J	1,100	1,008,776	8616.3	830	784,819	6412.9		
Anglo American	142	17,318	12.7	D	564	68,440	46.6	543	65,670	39.7		
Brakpan	233	47,189	229.5	D	926	186,647	913.5	943	192,186	968.2		
Daggas	107	18,192	42.6	D	418	70,774	160.9	386	64,012	116.6		
F. S. Geduld	95	81,956	658.3	S	654	561,176	4497.3	531	403,848	2954.0		
President Brand	120	97,131	852.3	S	807	659,481	5797.3	687	526,470	4424.4		
President Steyn	105	40,395	181.2	S	709	277,895	1267.4	662	257,822	1309.7		
S.A. Lands	97	20,129	43.0	D	380	79,158	168.2	370	77,783	221.6		
Springs	102	14,280	14.6	D	413	57,453	60.1	412	56,526	41.7		
Vaal Reefs	98	44,325	231.3	D	376	169,425	878.8	326	148,262	803.7		
Welkom	100	31,522	80.2	S	677	213,501	501.8	645	196,490	542.5		
Western Holdings	150	100,056	832.2	S	1,003	661,987	5451.0	738	428,380	3252.8		
West. Reefs, Ex.	144	40,608	139.2	D	544	153,080	503.7	472	122,303	339.0		
Central Mining	121	80,496	620.0	J	1,269	832,727	6313.8	1,085	709,013	5119.5		
Blyvoor	109	22,841	4.1	D	440	92,729	21.2	451	94,585	41.6		
City Deep	63	13,149	5.1	J	848	163,084	68.2	1,350	202,276	141.6		
Cons. M.R.	186	31,539	11.5	D	801	137,281	14.2	874	137,772	34.2		
Crown	209	53,018	80.4	D	861	219,958	362.2	868	225,744	478.2		
D. Roopepoort	151	61,156	273.6	J	1,435	573,007	2539.9	1,038	415,227	1640.0		
East Rand Prop.	131	12,707	1.0	J	1,352	131,974	6.3	1,331	131,961	21.9		
Harmony	22	3,852	0.5	D	102	17,077	3.7	157	21,233	0.6		
Modder East	56	12,802	48.6	D	229	52,212	179.6	224	55,770	1145.9		
Rose Deep	52	10,809	0.4	D	211	43,095	2.0	217	42,635	116.0		
J.C.I.*	23	4,768	3.1	D	90	17,435	12.4	123	21,514	33.4		
Freddies Cons.	129	38,055	242.3	D	530	156,144	1014.9	528	161,028	1079.2		
Govt. G.M.A.	70	12,605	20.6	D	292	53,207	103.2	279	51,744	64.9		
Randfontein	210	43,299	218.4	D	855	168,392	913.5	800	169,582	831.7		
Union Corporation	96	23,616	122.8	D	393	96,301	496.9	358	89,982	426.9		
East Geduld	158	53,727	335.6	D	618	207,060	1266.1	565	168,241	883.4		
Geduld Prop.	70	11,794	7.0	D	285	48,536	40.7	304	57,042	100.4		
Grootvlei	83	25,731	117.2	D	325	100,076	436.6	280	66,482	95.9		
Marievale	145	57,420	308.9	J	1,430	553,915	2891.7	1,240	424,372	1971.3		
St. Helena	29	6,818	26.0	D	112	26,556	98.4	122	28,836	119.5		
Van Dyk	29	6,999	22.1	J	298	71,110	226.4	297	70,660	235.4		
Winkelhaak	162	72,900	385.5	D	616	277,330	1433.9	530	265,928	1678.1		
General Mining	133	19,527	11.5	D	506	72,295	13.6	522	75,240	63.8		
Buffelsfontein	120	55,800	311.8	J	997	492,945	2969.4	867	132,807	3193.3		
Ellaton	81	11,213	116.7	J	538	111,652	1146.0	523	102,266	1132.4		
S. Roopepoort	11	1,284	1.5	D	43	4,986	122.5	39	4,162	135.9		
Stilfontein	185	28,028	21.7	J	1,849	277,039	237.2	1,820	267,297	143.2		
W. Rand Cons.	30	4,687	1.5	J	303	46,776	8.7	267	47,497	8.8		
Anglo Transvaal	136	29,240	14.4	J	1,323	299,751	139.6	1,143	294,117	321.7		
Hartebeestfontein	75	10,155	1.5	D	313	40,699	4.8	329	43,081	12.4		
Loraine	20	4,383	5.9	J	187	43,651	52.6	178	43,196	58.9		
N. Klerksdorp												
Rand Leases												
Village M.R.												
Virginia O.F.S.												
Others												
N. Kleinfontein												
Wit Nigel												

Gold has been valued at 249s. 5d. per oz. fine (March 249s. 8d.). L indicates loss. † Working Profit. *Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

ESTIMATED URANIUM REVENUE

Company	Year ends	April Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)	Company	Year ends	April Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
Goldfields	J	15.0	149.0	146.0	J.C.I.	D	7.0*	28.2*	25.9*
Doornfontein	J	94.0	934.0	902.0	E. Champ d'Or (b)	D	29.0*	121.0*	133.0*
Luipaards Vlei (a)	D	54.0	219.0	204.0	Freddies Cons.	D	23.0*	92.2*	88.1*
Vogels	J	50.0	498.0	465.0	Govt. G.M.A.	D	110.0*	440.2*	427.6*
West Drie	J				Randfontein (a)	D			
Anglo American	D	144.5	563.1	559.4	General Mining	J	209.0	2111.0	1999.0
Daggafontein	S	48.2	326.8	323.0	Buffelsfontein	D	18.0	70.0	77.0
P. Brand	S	62.2	428.0	422.0	Ellaton	D	88.0	361.0	352.0
P. Steyn	D	144.0	575.8	557.7	Stilfontein	D	206.3	836.9	799.6
Vaal Reefs	S	60.2	408.2	399.0	W. Rand Cons. (a)	D			
Welkom	D	160.9	649.0	630.4	Anglo Transvaal	J	260.0	2615.6	2578.6
West Reefs, Ex.	D				Hartebeestfontein	S	34.0	249.0	240.0
Central Mining	J	154.0	1521.2	1535.5	Loraine	D	10.5	42.5	44.0
Blyvoor	J	226.6	2032.0	1519.8	N. Klerksdorp	D	178.1	1771.4	1837.5
Harmony	J				Virginia O.F.S.	J			

Table includes profit from uranium acid and pyrite before loan redemption. (a) Total profit from uranium section. (b) Overall profit. * Net revenue after provision for loan redemption.

The British Electrical Power Convention

The British Electrical Power Convention makes its second visit to Bourne-mouth, for its twelfth annual meeting, from May 30 to June 2, 1960, under the presidency of the Rt. Hon. Viscount Chandos, P.C., D.S.O., M.C., chairman, Associated Electrical Industries, Ltd. The Convention proceedings, which will take place in the Pavilion, have as their theme this year "The New Horizon". The subject will be covered in four papers dealing with electrical manufacture, electricity supply, electrical export and electricity in the home.

The convention is representative of all the principal organizations, 41 in number, connected with the British electrical industry and is a direct successor of the Incorporated Municipal Electrical Association's Convention, whose 52nd and last meeting was held in Eastbourne in June, 1948.

The convention will take to Bourne-mouth over 2,000 people from all parts of Great Britain, Northern Ireland, the Isle of Man and the Channel Islands.

DRILL STEEL DEPARTMENT of well-established international company requires Technical (Sales) Representative for South-Western and Mid-Western area. The Company's own staff are aware of the vacancy. Apply confidentially to Box 664, *The Mining Journal Ltd.*, 15 Wilson Street, Moorgate, London E.C.2.

CHIEF SAFETY ENGINEER

Applications are invited for the post of *Chief Safety Engineer* at the National Coal Board's London Headquarters, in succession to Mr. W. F. Richardson who will retire on October 31, 1960.

The successful candidate will be the Head of the Safety Branch and responsible for that Branch's work to the Deputy Director-General of Production (Safety and Techniques).

Applicants must be qualified mining engineers with wide experience of mining methods, the hazards encountered in mining and the means of countering them. In addition, experience in the investigation of accidents, accident prevention work, fire-fighting, rescue work and organization, are essential.

There are attractive conditions of service, including superannuation. The starting salary will depend on qualifications and experience but will not be less than £2,500 per annum.

Applications, giving full particulars, should reach the Headquarters Staff Manager, National Coal Board, Hobart House, Grosvenor Place, S.W.1. not later than June 17, 1960, quoting (X1806).

What do you expect from your bank?



Security for your money, of course . . . the ability to make payments by cheque . . . advice when you need it . . . yes. But when you bank with the Westminster you become entitled to many more services than these. Did you know, for example, that the Westminster can make your money available to you almost anywhere in the world; that it will pay regularly-recurring items for you automatically; that it can obtain for its customers expert advice in matters of investment and foreign trade; that it will act as your Executor or Trustee. Your account at the Westminster Bank is the key to all these services—and that is a convincing reason why . . .

You should bank with the
WESTMINSTER

WESTMINSTER BANK LIMITED

British Banking in Asia



These are the territories served by THE CHARTERED BANK and its wholly-owned subsidiary, The Eastern Bank Limited, through a system of one hundred branches extending to most centres of commercial importance in the Middle East, South and South-East Asia and the Far East. Those branches provide complete and up-to-date banking services, sustained by expert knowledge and long experience of Eastern trade, finance and industry. An effective credit information service and skilled assistance and advice are available to United Kingdom merchants and manufacturers seeking new business connexions in Asian markets.

THE CHARTERED BANK

(Incorporated by Royal Charter, 1853)

HEAD OFFICE: 38 BISHOPSGATE, LONDON, E.C.2

Offices in the United Kingdom at Manchester and Liverpool.
Agencies at New York and Hamburg.

THE EASTERN BANK LIMITED

Head Office: 2 & 3 Crosby Square, London, E.C.3.

ASSOCIATED BANKS:

Allahabad Bank Ltd. (Incorporated in India)
The Irano British Bank (Incorporated in Iran)

Publications Received

Mining in France and the French Community.

The expansion of the mining industry in the territories under French control, and in particular the exploitation of oil and other minerals in North Africa, under the auspices of the Organization for the Sahara regions, are assuming ever-increasing importance in the pattern of world mineral production.

A continuous and up-to-date record of mining developments throughout the French Sphere of Influence is available through the following publications issued by the Ministère de l'Industrie Direction des Mines, in Paris:

Annales des Mines. This monthly review, founded in 1795, contains original articles on economic, technical, scientific and social problems of interest to the mining and metallurgical industries and on problems of energy. Its special issue of July-August includes comprehensive mineral statistics relating to France and the States of the French Community. There is also an administrative supplement covering laws, decrees and circulars of interest to the mining and metallurgical industries. This publication is obtainable from the Compagnie Française d'Éditions, 40 rue du Colisée, Paris 80. The annual subscription is 95 new francs a year without the administrative section, and 110 new francs with it.

Statistique de l'Industrie Minière. This is an annual publication giving detailed statistics of the mineral industry in France and the States of the French Community (production, exports, etc.), as well as statistics relating to boilers and steam engines. This publication costs 18 new francs and is now obtainable from the Compagnie Française d'Éditions. Statistics for the year 1957 have just appeared.

Carte des Richesses Minérales de la France. A map on the scale of 1/1,000,000, prepared by officials of the Department, was issued on April 1, 1959, and shows the precise location of concessions, exploitation permits and exploration permits for the principal minerals. Large-scale maps of the Nord-Pas-de Calais coalfield, the Lorraine iron ore field, and the mining region of the Cévennes are also available. These publications can be purchased from the Bureau de Recherches Géologiques et Minières, 74 rue de la Fédération, Paris 15^e, price 15 new francs.

Quin's Metal Handbook; 1959 Edition

The new issue, which is the Forty-Fifth Edition, comprises 640 pages, covering many countries and relating to prices, production, consumption, exports, imports, destinations and sources, brands and stocks of non-ferrous metals, ores, scrap, iron and steel, ferro-alloys, tinplates, blackplates, galvanized sheets, etc., etc. Concisely indexed, quick and easy reference to any metal in any part of the world is readily obtainable.

As in previous years, every endeavour has been made to make this volume as comprehensive as possible. It has been completely revised and brought up-to-date whilst a new feature of considerable

interest is the inclusion of extracts from the official Soviet Union foreign trade statistics for 1957 and 1958, relating to the exports and imports of ferrous and non-ferrous metals. Other new features include a daily weighted average price for electrolytic copper on a wirebar basis c.i.f. Europe, and approximate average analysis of some representative brands of antimony. In addition, the sections covering brands and analyses of copper, tin, lead and zinc have been revised and considerably enlarged.

Priced at £1 7s. 6d. a copy post free, copies may now be obtained from the publishers, Metal Information Bureau Limited, Birkett House, 27 Albemarle Street, London, W.1.

"Cemented Carbides", written by Schawartzkopf, P., and Kieffer, R. pp. 349. Illustrated. 1960, New York, The MacMillan Co. (Price 5 Gns.).

This book is based upon the second part of "Hartstoffe Und Hartmetalle" by the same authors, the first part having already been covered by "Refractory Hard Metals", which was published in 1953, and deals with the binder-free or uncemented carbides. The present volume takes account of progress since the publication of the original German work, and includes references up to 1959.

The book commences with a chapter on the historical development of hard metals and follows this with a chapter of 37 pages describing the technology of carbide production. Chapters 3 and 4 then devote 18 pages to an account of the mechanism of sintering, and chapter 5 describes in 26 pages the reactions that occur during the liquid-phase sintering of carbides, initially taking as a basis the quasi-binary WC-Co system, but soon proceeding to a consideration of the ternary and more complex systems.

Chapters 7 to 12 deal with the properties of the various compositions. Single carbides, multi-carbides, corrosion-resistant, heat-resistant, experimental and tungsten-free compositions are dealt with in successive chapters. This section, although it occupies only 67 pages, contains a great deal of information. Chapter 12, on oxide and boride tools for cutting, is rather unexpected in a book having the present title, but makes very interesting reading.

The two remaining chapters deal with the applications of cemented carbides as wear resistant materials and as tools for metal cutting. In the first of these a section on mining applications occupies a very useful 22 pages dealing first with rotary drilling and coal cutting tools, and then with tools for percussive drilling. Composition, tool life, speed of drilling and edge design are discussed.

In assessing the merit of this book, the publishers' claim that it is the definitive work on the subject must be borne in mind. The references total over a thousand, the diagrams are profuse and clear, an author index as well as a subject index is supplied, and the binding is very satisfactory. In addition, typographical errors are few. On the other hand, for the price, the book is slim and

not all sections appear to be of equal merit. The treatment given to the fundamental principles of the mechanism of sintering is rather cursory, and a more extended discussion of the phase work described in Chapter 5 would have been helpful. This might also have been integrated more closely with the metallographic accounts in chapter 6. In addition, it is not at all clear that the rather inadequate section in the fundamental mechanisms of wear in chapter 14, and the section on basic machining terminology in chapter 15, add much to the value of the work.

On balance it may be said that the wealth of carefully documented and illustrated information will make this book a valuable addition to the library of the industrialist. The student of fundamental theory, whilst finding a great deal that is of interest, may possibly feel that the definitive book on the subject has yet to be written.

F.C.

Technological Education in Britain.

By the Central Office of Information, published by H.M.S.O. price 3s. pp. 44

This pamphlet, first published in 1956, has been fully revised to include the latest information on developments in technological education, both in universities and technical colleges. A brief historical survey is followed by sections dealing with technological courses, qualifications and scholarships, apprenticeship training schemes, professional institutions and facilities for overseas students. A short reading list is included of the main commercially-published books and official reports on the subject.

★

Technical Publications on the Imperial Smelting Process.

Since 1957 a number of papers on zinc smelting have been published by Imperial Smelting Processes Ltd., St. Andrews Road, Avonmouth, Bristol, and the considerable demand for copies of reprints has resulted in this company publishing all the papers issued to date, assembled together in an expandable binding. The company express themselves willing, in their foreword, to give any additional information available on the process.

★

A new edition of the Ministry of Housing and Local Government's memorandum on the application of planning control to mineral working has been published. (*The Control of Mineral Working* H.M.S.O., price 4s. 6d.).

It is intended as a guide to local planning authorities in securing the proper development of the country's mineral resources, and to mineral operators in arranging their future operations. It indicates the broad lines of policy on the main problems raised by mineral working and explains the relevant planning provisions.

NATIONAL AND GRINDLAYS BANK LIMITED

Amalgamating

NATIONAL BANK OF INDIA LIMITED AND GRINDLAYS BANK LIMITED
(Established 1863) (Established 1828)

Head Office:

26, BISHOPSGATE, LONDON, E.C.2.

London Branches:

54 PARLIAMENT STREET, S.W.1 · 13 ST. JAMES'S SQUARE, S.W.1

Insurance Department at 54 Parliament Street

Travel Department at 13 St. James's Square

Trustee Departments at 13 St. James's Square, S.W.1 and at Government Road, Nairobi

A comprehensive banking service is available at branches in the following territories:

INDIA · PAKISTAN · CEYLON · BURMA · KENYA · UGANDA · TANGANYIKA

ZANZIBAR · ADEN · SOMALILAND PROTECTORATE

NORTHERN and SOUTHERN RHODESIA

Bankers to the Government in:

ADEN · KENYA · UGANDA · ZANZIBAR and SOMALILAND PROTECTORATE

GOVERNMENT OF NORTHERN RHODESIA

INSPECTOR OF MINES

Qualifications

Diploma or degree in Mining of recognized School of Mines or University. At least five years' experience, preferably in metalliferous mining industry, including knowledge of underground ventilation practice.

Age Limits

25 - 45

Duties

Enforcement of mining and explosives legislation, inspection of mines and accident investigation.

Terms of Appointment

On agreement for one tour (36 months) with prospect of permanent appointment after a probationary period.

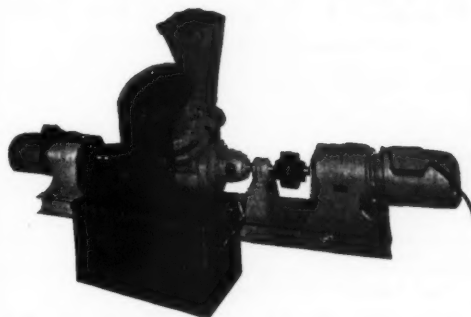
Emoluments

£990-£1,950 plus 5% special allowance. Free passages, quarters at rental, free medical attention, generous leave, taxation at local rates.

Apply to Director of Recruitment, Colonial Office, London, S.W.1, briefly stating age, qualifications and experience and quoting BCD.99/3/06/H1.

COMET

POWERFUL, POSITIVE-ACTION,
SLOW-REVVING PUMPS



A 4" heavy duty pump, driven simultaneously at each end by two 3 h.p. synchronised motors used for such applications as pumping liquorice, tar, soap, etc.

THE COMET PUMP & ENGINEERING
COMPANY, LIMITED

JOHNSON ROAD, WEST CROYDON

Telegrams: Comet, Croydon. Telephone: Thornton Heath 3816

Metal and Mineral Trades

A. STRAUSS & CO. LTD.

FOUNDED 1875

PLANTATION HOUSE, MINCING LANE, LONDON, E.C.3

METALSTelephone: Mincing Lane 5551 (10 lines)
Telegrams: Straussar Phone London

Telex GB LN 28858

RUBBERTelephone: Mansion House 9082 (3 lines)
Telegrams: Ascorub Phone London**MERCHANTS****EXPORTERS****IMPORTERS**

Non-Ferrous Metals — Virgin, Alloys, Scrap

RUBBER**COPPER REFINERS**

Members of the London Metal Exchange

Dealer Members of the Rubber Trade Association

Members of the National Association of Non-Ferrous Scrap Metal Merchants

EVERITT & Co. Ltd.

Telegraph Address: Persistent, Liverpool

40 CHAPEL STREET
LIVERPOOL
Phone: 2995 Central**SPECIALITY:****MANGANESE PEROXIDE ORES**

We are buyers of:

**WOLFRAM, SCHEELITE, VANADIUM,
MOLYBDENITE, ILMENITE, RUTILE,
ZIRCONIUM and TANTALITE ORES**

Suppliers of:

FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS**BLACKWELLS**Buyers and
consumers of**FOR ALLOYS**

- COLUMBITE
- TANTALITE
- TUNGSTEN
- MANGANESE

Makers of FERRO ALLOYS, NON-FERROUS ALLOYS
RARE METALS**BLACKWELL'S METALLURGICAL WORKS**Dept. 11., THERMETAL HOUSE, GARSTON, LIVERPOOL, 19
Telephone: Garston 980 Telegrams: Blackwell, LiverpoolTelegrams:
"BASSETT" PHONE, LONDON.Telephone:
MANSION HOUSE 4401/3.**BASSETT SMITH & Co. Ltd.**

(Incorporating George Smith & Son)

15/18 LIME ST., LONDON, E.C.3

METALS,**ORES (Copper, Zinc, Lead, &c., Complex),
RESIDUES, SKIMMINGS & ASHES
NON-FERROUS SCRAP****ROURA & FORGAS, LTD.**Telephone No:
GERRARD 9641*Sole Sterling Area Suppliers of***ITALIAN QUICKSILVER****COLQUHOUN HOUSE,****27/37 BROADWICK STREET, LONDON, W.1**

Cable Address: WAHCHANG, NEW YORK

WAH CHANG CORPORATION

(FORMERLY WAH CHANG TRADING CORPORATION)

233 BROADWAY**NEW YORK 7, NEW YORK****TUNGSTEN TIN****BUYERS****Tungsten Concentrates, Tungsten Tin Concentrates
Mixed Tungsten Ores
Tungsten Tailings, Scraps, Tips, Grindings
Tin Concentrates—Tin Dross, Tin Furnace Bottoms****SELLERS****Tungsten Concentrates to Buyers' Specifications
Tungsten Salts, Tungsten Powder
Tungsten Rods and Wires
Tungsten Ingots, Tin Oxides, Tin Chlorides****PLANT — GLEN COVE, NEW YORK**

**MINING &
CHEMICAL
PRODUCTS
LIMITED**



86 Strand
London WC2
Telephone
Covent Garden
3393

**Buyers of Ores,
Concentrates
and Residues of**

**BISMUTH
INDIUM
SELENIUM**

BARNET METAL CO., LTD.
Elektron House, Brookhill Road, New Barnet, Herts
Phone: Barnet 5187 and 3901
STOCKISTS OF: Aluminium, Brass and Copper
BUYERS OF: all non-ferrous scrap
The RIGHT firm to deal with

RHONDDA METAL CO. LTD.
1 HAY HILL, BERKELEY SQ., LONDON, S.W.1.
Works: PORTH, GLAM.
**PHOSPHOR COPPER,
PHOSPHOR BRONZE, LEAD BRONZE,
GUNMETAL, BRASS**
Telephone: MAYFAIR 4654 Cables: RONDAMET



**WORLD-WIDE
SERVICE**

**DANIEL C.
GRIFFITH
& CO. LTD.**
ASSAYERS
TO THE BANK OF ENGLAND
**27/33, PAUL STREET,
LONDON, E.C.2.**

Branch Office: LEFKA, Cyprus

Also in :
AUSTRALIA
BELGIUM
CANADA
DENMARK
FRANCE
GERMANY
HOLLAND
INDIA

Represented throughout Great Britain

*Analytical Chemists, Samplers
at all Ports and Works*

Analyses of
**PRECIOUS METALS
BASE METALS
ORES and RESIDUES
Etc.**

**ITALY
JAPAN
NEW ZEALAND
POLAND
PORTUGAL
SPAIN
SWEDEN
SWITZERLAND
U.S.A.**

Telephone :
MONARCH 1314 (3 lines)

Telegraphic Address :
"GRYFFYDD, LONDON"

**AYRTON
AND
PARTNERS
LIMITED**

**NON-FERROUS METALS
ORES • MINERALS AND RESIDUES**

**TELEPHONE: MONarch 7541
TELEX: LONDON 2-2475
CABLES: PARTONAYR**

**IMPERIAL HOUSE
DOMINION STREET
LONDON . E.C.2**

THE STRAITS TRADING COMPANY LIMITED
P.O. Box 700, OCEAN BUILDING, SINGAPORE
Works: SINGAPORE & PENANG

STRAITS REFINED TIN
— "THE STRAITS TRADING CO. LTD." BRAND —

THE BRITISH TIN SMELTING CO. LTD., LIVERPOOL

London Agents:
W. E. MOULSDALE & CO. LTD., 2 Chantrey House, Eccleston Street, S.W.1



MECHANICAL HANDLING EQUIPMENT



This is a complete staithes reconstruction. The old staithes and accumulator frame can be seen on the right of the new building, where barges are now boom loaded.

Left: An internal view of the building, looking from the main doors. Note: The end discharge tippler is shown plated over. Hydraulic pumps are housed on the right, and the boom winches can be seen in the background.

(Photographs by kind permission of the National Coal Board)

CAPACITY	100 tons per hour each
WIDTH OF BELTS	36"
BELT SPEEDS	100 ft. per min.
ANGLE OF RISE	17°

HUDSWELL, CLARKE & CO LTD

DESIGNERS AND BUILDERS OF COLLIERY MECHANICAL HANDLING EQUIPMENT,
AND SURFACE & UNDERGROUND LOCOMOTIVES OF ALL TYPES

JACK LANE, LEEDS 10 Telephone: Leeds 34771 (10 lines) Cables: Loco, Leeds

LONDON OFFICE:

14 Howick Place, Victoria Street, S.W.1. Telephone: VICTORIA 6786 Telegrams: Hudclar, Sowest, London Cables: HUDCLAR, London

9, 1960



don

d.